Explosion-protected 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. Intended 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 and understood before working with the device!
These operating and installation instructions contain important information about servicing. They must therefore be kept in close proximity 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 limit 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

Designation: B 2050
Material No.: 6053002
Series: Gear units and geared motors
Type series: SK 5207 – SK 15507 and SK 5217 – SK 11217
Gear unit types: Industrial gear units

Version list

<table>
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<tr>
<th>Title, Date</th>
<th>Order number</th>
<th>Remarks</th>
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<td>6053002 / 0613</td>
<td>-</td>
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<td>6053002 / 3814</td>
<td>General corrections</td>
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<td>B 2050, April 2015</td>
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<td>B 2050, March 2016</td>
<td>6053002 / 0916</td>
<td>Revision of ATEX documentation / extension of options, new declarations of conformity, general corrections</td>
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<td>B 2050, May 2017</td>
<td>6053002 / 1817</td>
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<tr>
<td>B 2050, May 2019</td>
<td>6053002 / 1819</td>
<td>Revision of ATEX documentation, extension of the series MAXXDRIVE® XT series, new Declarations of Conformity, general corrections</td>
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</tbody>
</table>

Table 1: Version list B 2050
Copyright notice

As an integral component of the device described here, this document must be provided to all users in a suitable form.
Any editing or amendment or other utilisation of the document is prohibited.

Publisher

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Member of the NORD DRIVESYSTEMS Group
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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 personal injuries or damage to material or assets which result from failure to observe the operating instructions, incorrect operation, deployment of inadequately qualified personnel, improper use or modifications to the gear unit, including installed or attached components.

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 designations used

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>! DANGER</td>
<td>Indicates an immediate danger, which may result in death or serious injury.</td>
</tr>
<tr>
<td>! DANGER</td>
<td>Indicates an immediate danger, which may result in death or serious injury.</td>
</tr>
<tr>
<td>! WARNING</td>
<td>Indicates a possibly dangerous situation, which may result in death or serious injury.</td>
</tr>
<tr>
<td>! CAUTION</td>
<td>Indicates a possibly dangerous situation, which may result in slight or minor injuries.</td>
</tr>
<tr>
<td>! NOTICE!</td>
<td>Indicates a possibly harmful situation, which may cause damage to the product or the environment.</td>
</tr>
<tr>
<td>! Information</td>
<td>Indicates hints for use and useful information.</td>
</tr>
</tbody>
</table>
1.3 Intended use

These gear units generate a rotational movement and are intended for use in commercial systems. They satisfy the explosion protection requirements of Directive 2014/34/EU for the product category indicated on the type plate. No mixture from categories IID and IIG may be present during operation. The ATEX approval is void in case of a hybrid mixture.

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.

---

**WARNING**

**Explosion hazard**

Only components which comply with the applicable regulations of Directive 2014/34/EU may be fitted and operated.

Observe the Declaration of Conformity and all safety information for the components.

---

**WARNING**

**Danger to persons**

Appropriate safety measures must be taken in the case of applications in which failure of a gear unit or geared motor may cause a hazard to persons.

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.
ATEX ignition hazards according to DIN EN ISO 80079-36

The following ignition protection types are used:

• Measures to ensure constructional safety "c"
  – Strength and thermal calculations for all applications,
  – Selection of suitable materials and components,
  – Calculation of a recommended interval for general overhaul,
  – Inspection interval for lubricant level, therefore ensuring lubrication of bearings, seals and gears,
  – Requirement for thermal check during commissioning.

• Measures to ensure encapsulation with liquid "k"
  – The gears are lubricated with a suitable lubricant,
  – Statement of approved lubricants on the type plate,
  – Statement of lubricant fill levels.

• Measures to ensure monitoring of sources of ignition "b"
  – Use of temperature monitoring as ignition protection system b1.
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 ⚠️

Explosion hazard

Explosion hazard. Failure to comply may cause severe or even fatal injuries.

All work, e.g. transportation, storage, installation, electrical connection, commissioning, servicing and maintenance must be performed in a non-explosive atmosphere.

⚠️ 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 driven elements or secure the parallel keys 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. As standard, covers are fitted by NORD. The covers must always be used if contact protection is not provided by other methods.

⚠️ DANGER ⚠️

Severe personal injury

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 Serious personal injury and material damage

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
2 Description of gear units

2.1 Type designations and gear unit types

<table>
<thead>
<tr>
<th>Gear unit types / Type designations</th>
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<tr>
<td>Helical gear units</td>
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<tr>
<td>2-stage</td>
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<tr>
<td>SK 5207</td>
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<td>SK 6207</td>
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<td>SK 7207</td>
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<td>SK 8207</td>
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<td>SK 9207</td>
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<td>SK 10207</td>
</tr>
<tr>
<td>SK 11207</td>
</tr>
<tr>
<td>SK 12207</td>
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<tr>
<td>SK 13207</td>
</tr>
<tr>
<td>SK 14207</td>
</tr>
<tr>
<td>SK 15207</td>
</tr>
</tbody>
</table>

Table 2: Type designations and gear unit types

Double gear units consist of two single gear units.
SK 5207 - SK 15507 and SK 5217 – SK 11217 gear units should be treated according to these instructions. The operating and assembly manual B 2000 should be used for attached gear units.

Type designation for double gear units: e.g. SK 13307 /7282 (consisting of single gear units SK 13307 and SK 7282).
## Table 3: Versions and options

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
<th>Details on type plate</th>
<th>Details on type plate</th>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>A</td>
<td>Hollow shaft version</td>
<td>…K</td>
<td>with elastic coupling</td>
<td>X</td>
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<tr>
<td>B</td>
<td>Fastening element</td>
<td>…T</td>
<td>with hydrodynamic coupling</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>CC</td>
<td>Cooling coil</td>
<td>MS...</td>
<td>Motor swing base</td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td>CS1 X</td>
<td>Cooling system oil / water</td>
<td>…K</td>
<td>with elastic coupling</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>CS2 X</td>
<td>Cooling system oil / air</td>
<td>…T</td>
<td>with hydrodynamic coupling</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Torque support</td>
<td>MT</td>
<td>Motor mount</td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td>EA</td>
<td>Splined hollow output shaft</td>
<td>NEMA</td>
<td>Standard NEMA motor attachment</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>ED2)</td>
<td>Elastic torque support</td>
<td>OT</td>
<td>Oil level tank</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>EV</td>
<td>Splined solid output shaft</td>
<td>PT100</td>
<td>Temperature sensor</td>
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<td>EW</td>
<td>Splined drive shaft</td>
<td>R</td>
<td>Back stop</td>
<td>X X</td>
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<tr>
<td>F</td>
<td>Block flange</td>
<td>S</td>
<td>Shrink disc</td>
<td>X X</td>
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<tr>
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<td>Fan</td>
<td>V</td>
<td>Solid output shaft</td>
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<td>VL</td>
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<tr>
<td>F1</td>
<td>Drive flange</td>
<td>VL2</td>
<td>Agitator version</td>
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<tr>
<td>H/H66</td>
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<td>VL3</td>
<td>Agitator version</td>
<td>X X</td>
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<tr>
<td>IEC</td>
<td>Standard IEC motor mounting</td>
<td>VL43)</td>
<td>Agitator version</td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td>KL2</td>
<td>Agitator version</td>
<td>VL63)</td>
<td>Agitator version</td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td>KL3</td>
<td>Agitator version</td>
<td>VL53)</td>
<td>Extruder flange version</td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td>KL43)</td>
<td>Agitator version</td>
<td>W</td>
<td>One free drive shaft journal</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>KL63)</td>
<td>Agitator version</td>
<td>W2</td>
<td>Two free drive shaft journals</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>Solid output shaft on both sides</td>
<td>W3</td>
<td>Three free drive shaft journals</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>LC/LCX1)</td>
<td>Lubricant circulation</td>
<td>WX3)</td>
<td>Auxiliary drive unit</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>MF...</td>
<td>Motor base frame</td>
<td>DRY3)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) With pressure monitor  
2) Also only stated with D on the type plate  
3) Only for ATEX 3G/3D
Certain versions / options can only be used for particular gear unit sizes or configurations.

Figure 1: MAXXDRIVE® XT 2-stage helical bevel gear unit
3 Assembly instructions, storage, preparation, installation

Please note all safety information 1.4 "Safety information" and warning information in the relevant sections.

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.

An additional lashing point may be required for versions which deviate greatly from the following illustrations, or in the case of additional drive units and components.

In this case, please contact NORD Service.
3.1.1 Standard gear units

Gear units may only be transported with lifting ropes and chains or lifting straps at an angle of 90° to 70° to the horizontal.

Legend

1: Lifting strap
2: Shackle
X: Not permissible
✓: Permissible

Figure 2: Transport of standard gear unit
3.1.2  with motor adapter

Gear units with motor adapters 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.

---

**Legend**

1: Lifting strap
2: Shackle
X: Not permissible
✓: Permissible

**Figure 3: Transport of gear unit with motor adapter**
3.1.3 with V-belt drive

Agitator version gear units 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.

---

**Legend**
- 1: Lifting strap
- 2: Shackle
- **X**: Not permissible
- ✓: Permissible

**Figure 4: Transport of agitator version gear units**
## 3.1.4 on motor swing base or base frame

Gear units on a motor swing base or base frame may only be transported with lifting ropes and chains or lifting straps at an angle of 90° to 70° to the horizontal. Only use the attachment points on the motor swing base or base frame.

**Legend**

1: Lifting strap  
2: Shackle  
\(\times\): Not permissible  
\(\checkmark\): Permissible

**Figure 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 gear units in the fitting position (7.2 "Installation orientation") and secure them 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 7.2 "Installation orientation" and secure 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.
- Store in a dry place.
- In tropical regions the drive 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
- The position of the shaft should be changed within 9 months in order to prevent damage to the bearings or the shaft sealing rings.
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 Inspecting the drive unit

Explosion-hazard

Explosion hazard. Failure to comply may cause severe or even fatal injuries.

All work, e.g. transportation, storage, installation, electrical connection, commissioning, servicing and maintenance must be performed in a non-explosive atmosphere.

The gear unit must be inspected and may only be installed if:
• No damage, e.g. due to storage or transport is apparent. In particular the radial seals, the sealing caps and the covers must be inspected for damage.
• No leakage or no oil loss is visible.
• No corrosion or other indications of incorrect or damp storage is apparent.
• The packaging material has been completely removed.
3.5 Checking the type plate data

**DANGER**

Explosion hazard

Explosion hazard. Failure to comply is likely to cause severe or even fatal injuries.

It must be checked and ensured that the gear unit type, all technical data and the ATEX labelling conform to the planning of the plant or the machine.

The type plate must be firmly attached to the gear unit and must not be subjected to permanent soiling. Please contact the NORD service department if the type plate is illegible or damaged.

![Figure 6: Name plate (example)](image-url)
### Explanation of the type plate

<table>
<thead>
<tr>
<th>No.</th>
<th>Abbreviation</th>
<th>Unit</th>
<th>Designation</th>
<th>See Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Type SK</td>
<td>-</td>
<td>NORD gear unit type</td>
<td>2.1</td>
</tr>
<tr>
<td>2</td>
<td>No.</td>
<td>-</td>
<td>Serial number</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>(n_2)</td>
<td>rpm</td>
<td>Rated speed of gear unit output shaft*</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>(M_2)</td>
<td>Nm</td>
<td>Max. permissible gear unit output shaft torque</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>(F_{R2})</td>
<td>kN</td>
<td>Max. permissible transverse force on the gear unit output shaft</td>
<td>7.2</td>
</tr>
<tr>
<td>6</td>
<td>(F_{A2})</td>
<td>kN</td>
<td>Max. permissible axial force on the gear unit output shaft</td>
<td>3.18.1</td>
</tr>
<tr>
<td>7</td>
<td>(n_1)</td>
<td>rpm</td>
<td>Rated speed of the gear unit drive shaft or drive motor*</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>(P_1)</td>
<td>kW</td>
<td>Max. permissible drive power or motor power</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>(F_{R1})</td>
<td>kN</td>
<td>Max. permissible transverse force on the gear unit drive shaft for option W</td>
<td>3.18.1</td>
</tr>
<tr>
<td>10</td>
<td>(\square)</td>
<td>kg</td>
<td>Total weight</td>
<td>3.18.1</td>
</tr>
<tr>
<td>11</td>
<td>(i_{tot})</td>
<td>-</td>
<td>Overall gear unit ratio</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>IM</td>
<td>-</td>
<td>Version (installation orientation)</td>
<td>3.18.1</td>
</tr>
<tr>
<td>13</td>
<td>Bj</td>
<td>-</td>
<td>Year of manufacture</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>(T_u)</td>
<td>°C</td>
<td>Permissible ambient temperature range for the gear unit</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>(x_{R2})</td>
<td>mm</td>
<td>Max. dimension for the point of application of the transverse force (F_{R2})</td>
<td>3.18.1</td>
</tr>
<tr>
<td>16</td>
<td>Oil</td>
<td>-</td>
<td>Type of gear oil (standard designation) and gear oil volume</td>
<td>7.3.2</td>
</tr>
</tbody>
</table>
3 Assembly instructions, storage, preparation, installation

<table>
<thead>
<tr>
<th>No.</th>
<th>Abbreviation</th>
<th>Unit</th>
<th>Designation</th>
<th>See Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>-</td>
<td></td>
<td>Ex labelling, suffix &quot;X&quot; indicates special documentation Labelling according to ATEX (DIN EN ISO 80079-36 or DIN EN 13463-1): 1. Group (always II, not for mines) 2. Category (2G, 3G for gas or 2D, 3D for dust) 3. Labelling of non-electrical devices (Ex h) or ignition protection type if fitted (c) 4. Explosion group if present (Gas: IIIC, IIB; Dust: IIIIC, IIIB) 5. Temperature class (T1-T3 or T4 for gas) or max. surface temperature (e.g. 125 °C for dust) or special max. surface temperature see indication of the temperature range on the type plate or in the special documentation 6. EPL (equipment protection level) Gb, Db, Gc, Dc 7. Note the special documentation and/or temperature measurement during commissioning (X)</td>
<td>7.8</td>
</tr>
<tr>
<td>18</td>
<td>MI</td>
<td>h</td>
<td>Interval between general overhauls in operating hours. This corresponds to 90% of the nominal service life</td>
<td>5.2.19</td>
</tr>
<tr>
<td>19</td>
<td>S</td>
<td>-</td>
<td>Number of the special documentation, consisting of serial no. / year</td>
<td></td>
</tr>
</tbody>
</table>

* The maximum permissible speeds are 10% above the rated speed, if the maximum permissible drive power $P_1$ is not exceeded.

If the fields $F_{R1}$, $F_{R2}$, and $F_{A2}$ are empty, the forces are zero. If the field $x_{R2}$ is empty, the point of application of force $F_{R2}$ is central on the driven shaft journal.

Table 4: Explanation of type plate

Please note that for geared motors (gear units with attached electric motors) the electric motor has its own type plate and separate ATEX designation. The motor labelling must also comply with data for the planning of the plant or the machine.

The lowest explosion protection level on the gear unit and the motor labelling applies for the geared motor unit.

If the electric motor is driven with a frequency inverter, the motor requires ATEX approval for inverter operation. If the motor is operated with an inverter, significant differences between the nominal speeds on the type plates of the motor and the gearbox are normal and permissible. For operation of the motor with the mains supply, differences of the nominal speeds on the motor and the gear unit of up to ± 60 rpm are permissible.
3.6 Checking the configuration

**DANGER**

Explosion hazard. Failure to comply may cause severe or even fatal injuries.

- The gear unit may only be operated in the (3.5 "Checking the type plate data") installation position (7.2 "Installation orientation" stated on the type plate. If an X is present in the field IM, the special documentation, whose number is in field S, must be observed.
- It must be ensured that the installation position cannot be changed during operation.
- All of the fastenings provided must be used.
- Oil level inspection points, oil drains and venting devices must be freely accessible (7.1 "Standard positions of the oil drain, vent and oil level").

3.7 Preparing for installation

**DANGER**

Explosion hazard. Failure to comply is likely to cause severe or even fatal injuries.

- Care must be taken that drive elements attached to the gear unit, such as clutches, pulleys etc. and drive motors are also ATEX-compliant.

**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.
- Risk of injury due to sharp edges and corners on the tensioning belts and by tensioning belts which spring back when they are cut.
- The drive unit must be inspected and may only be installed if no leaks are apparent. In particular the shaft sealing rings and sealing caps must be inspected for damage.
- Pay attention to leaked lubricants, they may cause slips.

All bare metal surfaces and shafts of the geared motor 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.
Oil filling

Gear units and geared motors are not filled with oil as standard when delivered from the factory. For filling, details of the type and quantity of lubricating oil must be obtained from the type plate (3.5 "Checking the type plate data").

The quantity of lubricating oil which is stated in Section 7.3.3 "Lubricant quantities" should be regarded as a guide value and may vary according to the speed ratio. The value which is stated on the type plate is specific to the order and is therefore more precise.

As an option, the gear unit can be filled with lubricant. In all cases, the oil level must be checked as per Section 5.2.7 "Oil level" prior to commissioning.

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

Oil level tanks (Option: OT) are fitted as standard prior to delivery of the gear unit. If this is not the case, the intended position can be obtained from the order-related dimension sheet.

Gears with integrated return stops are marked with arrows on the drive/driven 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 correct direction of rotation.

If possible, the shaft sealing rings or the gear unit should be protected from exposure to direct sunlight.

**NOTICE!**

Gear unit damage

For gear units with an integrated backstop, 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 which attack metal, lubricants or elastomers are present in the area surrounding the installation site or are subsequently expected during operation. In case of doubt, please contact Getriebebau NORD and take the recommended action.

**NOTICE!**

Gear unit damage

Gear units which are filled with VCI concentrate (long-term storage) are completely sealed for storage.

- Take care that the vent is fitted and released as necessary prior to commissioning the geared motor. The installation position can be obtained from the specific dimension sheet for the order.
### 3.8 Installing the gear unit

#### DANGER

**Explosion hazard**

Explosion hazard. Failure to comply is likely to cause severe or even fatal injuries.

- No explosive atmosphere must be present when installing the gear unit.
- The cooling air supplied to the gear unit/geared motor must be within the permissible temperature range stated on the type plate.
- Protect the gear unit from direct sunlight (e.g. with a sunshade)
- In case of direct exposure to sunlight the temperature of the cooling air which is passed over the gear / geared motor must be at least 10 K less than the maximum permissible ambient temperature (see type plate value $T_u$).

#### WARNING

**Hazard due to heavy loads**

Danger of injury and damage to the gear unit may be caused by incorrect attachment.

- Use the lashing point provided on the gear unit for installation (see Section 3.1 "Transporting the gear unit").
- Do not attach additional loads to the gear unit.
- Avoid pulling the eyebolts at an angle.

#### 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. The following points must be observed for installation:

- Ensure a free flow of air to all sides of the gear unit.
- Ensure adequate space around the gear unit.
- Ensure that there is a free space of 30° around fan intakes.
- With geared motors, the cooling air of the motor fan must be able to flow onto the gear unit without obstruction.
- Do not enclose or encase the gear unit / geared motor.
- Do not subject the gear unit to highly energetic radiation.
- Do not direct warm exhaust air from other units onto the gear unit / geared motor.
- The base or flange to which the gear unit is attached must not input any heat into the gear unit during operation.
- Do not allow dust to accumulate in the area of the gear unit.

Please contact NORD if the conditions stated above cannot be met.

---

NOTICE!  

**Gear unit damage**

Forces which are caused by incorrect installation may cause premature damage to the gear unit.

- 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 on which the gear unit is fitted must be vibration-free, torsionally rigid and flat.

**The flatness of the bolting surface on the base must be of the appropriate precision (See Section 7.5 "Tolerances for bolting surfaces").**

Any contamination to the bolting surfaces of gear unit and base 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.

Bolts with a minimum quality of 8.8 must be used to fasten the gear unit. The bolts must be tightened to the correct torques (See Section 7.4 "Torque values").
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 specific dimension sheet for the order.

**NOTICE!**

**Gear unit damage**

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

- The gear housing must always be earthed.
- For geared motors, earthing via the motor connection must be ensured.
- Welding on the gear unit is prohibited.
- The gear unit must not be used as the earth connection for welding work, as this may cause damage to the bearings and gears.
3.9 Motor (Option: IEC, NEMA)

**DANGER**

Explosion hazard

Explosion hazard. Failure to comply is likely to cause severe or even fatal injuries.

- Only standard motors with an adequate ATEX Zone category according to the type plate may be used.
- For ATEX category 2D gear units (see the ATEX labelling on the last line of the gear unit type plate), the motor must have at least protection class IP6x.
- Only couplings which are approved and labelled for use in explosion hazard areas may be used. The ATEX labelling must conform to the details of the system and/or machine design.

**WARNING**

Risk of injury

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

- Secure the drive against accidental start-up.
- The operating and assembly instructions for the coupling must be observed.

The maximum permitted motor weights and the dimension "X max" stated in the table below must not be exceeded when attaching the motor to an IEC or NEMA adapter:

<table>
<thead>
<tr>
<th>Maximum permitted IEC and NEMA motor weights</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IEC</strong></td>
</tr>
<tr>
<td><strong>NEMA</strong></td>
</tr>
<tr>
<td><strong>Centre of gravity X max1)</strong> [mm]</td>
</tr>
<tr>
<td><strong>Weight [kg]</strong></td>
</tr>
</tbody>
</table>

1) see Figure 7 for maximum permitted X dimension

Table 5: IEC and NEMA motor weights
Table 2: Transnorm motor weights

NORD must be consulted if the values stated in the table are exceeded.

1: Centre of gravity of motor

Figure 7: Centre of gravity of motor
Installation of motors with standard couplings (Rotex®)

**NOTICE!**

Gear unit damage

The separate manufacturer’s documentation must be observed for installation

1. Clean the motor shaft and flange surfaces of the motor and adapter and check for damage. Check the attachment dimensions and tolerance of the motor and the adapter.

2. Push the coupling hub onto the motor shaft so that the parallel key of the motor engages into the groove in the coupling half on tightening.

3. Pull the coupling halves 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.

![Figure 8: Fitting the coupling to the motor shaft](image)

4. Secure the coupling half with the threaded pin. The threaded pin must be coated with a securing adhesive (e.g. Loctite 242, Loxeal 54-03) and tightened to the correct torque (7.4 “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 (e.g. Loctite 574 or Loxeal 58-14) so that the flange seals after mounting.

6. Mount the motor on the adapter. Do not forget the ring gear

7. Tighten the adapter bolts to the correct torque (7.4 “Torque values”).

If a different type of coupling is used, observe the documentation from the manufacturer for the assembly sequence.
3.10 Gear unit with hollow shaft (Option: A, EA)

**NOTICE**

**Gear unit damage**

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

- The gear unit must be fitted onto the hollow shaft of the machine 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 facilitated by applying an anti-corrosive lubricant to the points described 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.

![Figure 9: Applying lubricant to the shaft and the hub](image)

Notice:

**Not for gear units with shrink discs (3.10.2)!**

The required length of the parallel key of the solid shaft of the machine must be appropriately designed by the customer in order to ensure the safe transmission of forces. If splines are used (Option: EA) to transmit the forces, it must be ensured that the splines on the solid shaft of the machine are of the correct size and tolerances.
### 3.10.1 Hollow shaft with fastening element (Option: B)

#### Information

The gear unit can be fitted to solid shafts with and without a shoulder using the fastening element. The screw of the fastening element must be tightened with the appropriate torque (7.4 "Torque values").

#### Fastening element

<table>
<thead>
<tr>
<th>Assembly</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Assembly Diagram" /></td>
<td>1 Fastening element</td>
</tr>
<tr>
<td>2 Circlip</td>
<td></td>
</tr>
<tr>
<td>3 Threaded rod</td>
<td></td>
</tr>
<tr>
<td>4 Threaded nut</td>
<td></td>
</tr>
<tr>
<td>5 Securing screw</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Securing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image2" alt="Securing Diagram" /></td>
<td>6 Sealing cap</td>
</tr>
<tr>
<td>7 Threaded rod</td>
<td></td>
</tr>
<tr>
<td>8 Disassembly element</td>
<td></td>
</tr>
<tr>
<td>9 Threaded nut</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3" alt="Dismantling Diagram" /></td>
<td>8 Disassembly element</td>
</tr>
<tr>
<td>9 Threaded nut</td>
<td></td>
</tr>
</tbody>
</table>

*Figure 10: Assembly and disassembly of the fastening element (schematic diagram)*
3.10.2 Hollow shaft with shrink disc element (Option: S)

**CAUTION**  
Risk of injury

Risk of injury from incorrect mounting and dismantling of the shrink disc.

**NOTICE!**  
Gear unit damage

The separate manufacturer's documentation for the shrink disc must be observed for installation.

**NOTICE!**  
Gear unit damage

Bearings, gear wheels, shafts and housings may be damaged by incorrect assembly.

- The hollow shaft of the gear unit unit must be fitted onto the solid shaft of the machine 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.
- If the tensioning bolts of the shrink disc are tightened without the solid shaft inserted, the hollow shaft may be permanently deformed. Do not tighten the bolts if the solid shaft is not inserted!
- When re-assembling the shrink disc, the tensioning bolts must be cleaned and the thread and head surfaces treated with grease which does not contain Molycote.

**NOTICE!**  
Gear unit damage

Hollow shafts with shrink discs must not be mounted on solid machine shafts with shoulders in order to avoid tension or rubbing between the hollow shaft and the shoulder.

Unless otherwise stated in the specific dimension sheet for the order, the external diameter of the customer's shaft must have a fit of h6 if the diameter is up to and including 160 mm or g6 for larger diameters. The fit must be according to DIN EN ISO 286.

The material of the customer's shaft must have a minimum yield strength of 360 N/mm². This ensures that no permanent deformation occurs due to the clamping force.
Standard fitting procedure for 2-part shrink discs:

1. Remove the cover if present

2. Loosen the tensioning bolts of the shrink disc but do not remove them. Tighten them gently by hand until there is no play between the flanges and the inner ring.

3. Push on the shrink disc up to the specified position (refer to the specific dimension sheet for the order).

4. The solid shaft of the machine must be completely de-greased prior to assembly.
   a. Do not apply grease to standard hollow machine shafts.
   b. In the case of special hollow shafts with a bronze bushing, the solid shaft of the machine must be greased in the area which will later come into contact with the bushing in the hollow shaft of the gear unit (Figure 11). It is essential that the tensioning seat of the hollow shaft is free of grease.

5. The hollow shaft of the gear unit and its bushing must be completely de-greased in order to avoid accidental greasing in the area of the shrink connection.

6. Insert the solid shaft of the machine into the hollow shaft so that the area around the shrink connection is completely filled.

7. Evenly tighten the tensioning bolts of the shrink disc in **sequence** in the clockwise direction in several stages.

![Figure 11: Machine shaft assembly for special hollow shafts with shrink discs](image)
8. After tightening the tensioning bolts the face of the inner ring on the screw side must be flush with the face of the outer ring. The shrink disc must be checked visually for distortion (Figure 12).

![Figure 12: Fitted shrink disc](image)

9. The hollow shaft of the gear unit and the solid shaft of the machine should be marked in order to detect any slippage under load.

**Standard disassembly procedure:**

1. Evenly loosen the tensioning bolts of the shrink disc in **sequence** in the clockwise direction in several stages. Do not remove the tensioning bolts from their thread.

2. If the external ring does not detach from the inner ring after approx. one turn of all screws, the external ring can be released with the aid of the push-off thread. For this, the required number of tensioning bolts are uniformly screwed into the push-off thread until the external ring separates from the internal ring.

3. The gear unit is removed from the solid shaft of the machine by pushing against the hollow shaft.

If a shrink disk has been in use for a long period or is dirty, it must be dismantled, cleaned and the conical surfaces coated with Molykote G Rapid Plus or a similar lubricant before it is refitted. The threads and head surfaces of the screws must be treated with grease without Molykote. Any damaged or corroded elements must be replaced.
3.11 Flange version gear units (Option: F, FK, VL2/3/4/5, KL2/3/4)

**NOTICE!** Gear unit damage

Additional forces due to distortion of the gear unit may cause damage.

- Flange version gear units must only be bolted to the flange of the driven machine.
- The bolting surface of the driven machine must comply with the tolerances in Section 7.5 "Tolerances for bolting surfaces".
- The flange of the driven machine must be free of vibration and torsionally rigid
- The bolting surfaces of both flanges must be clean.

The diameter of the hole circle and the size of the threaded holes on the flange of the gear unit must be obtained from the specific dimension sheet for the order.

3.12 Motor base frame and motor swing base (Option: MS, MF)

**WARNING** Risk of injury

Risk of injury due to rapidly rotating components while the cover is removed:

- Secure the drive against accidental start-up
- Observe the manufacturer's operating and assembly instructions for couplings and brakes

**NOTICE!** Gear unit damage

Components between the motor and the gear unit, e.g. turbo couplings or brakes are pre-adjusted prior to delivery:

- The alignment and adjustment of these components must be checked according to the corresponding manufacturer's documentation prior to commissioning the gear unit.
- Incorrect alignment will result in premature failure of the attached components and other parts of the gear unit.
### 3.13 Internal cooling system (Option: CC)

**DANGER**

*Explosion hazard*

Explosion hazard. Failure to comply is likely to cause severe or even fatal injuries.

- The cooling system may only be operated in combination with a temperature monitoring device (PT100).
- The special ATEX documentation provided by NORD must be observed.

**WARNING**

*Risk of injury*

Possibility of injury due to pressure discharge.

- Ensure that the pressure is released from the cooling circuit before carrying out any work on the gear unit.

For the inlet and outlet of cooling fluid, connections with pipe threads are provided on the gear unit or the casing cover for fitting pipes or hoses. The exact size of the pipe thread can be obtained from the specific dimension sheet for the order.

**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!**

*Gear unit damage*

Do not twist the connections during or after assembly as otherwise the cooling coil may be damaged.

- It must be ensured that no external forces act on the cooling coil.
- Vibrations must be avoided (fatigue fracture)

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

![Cooling coil](image)

1: Cooling coil

*Figure 13: Cooling cover with cooling coil fitted (schematic diagram)*
3.14 External cooling system (Option: CS1-X, CS2-X)

**DANGER**

Explosion hazard

Explosion hazard. Failure to comply is likely to cause severe or even fatal injuries.

- For operation in explosion hazard atmospheres, only approved and labelled cooling systems may be used.
- The ATEX labelling must conform to the details of the system and/or machine design.
- The cooling unit may only be operated in combination with a temperature monitoring device (PT100).
- The special ATEX documentation provided by NORD must be observed.

**NOTICE!**

**Gear unit damage**

The separate manufacturer’s documentation must be observed for assembly.

Connect the cooling system as shown in Figure 14. In consultation with NORD, other connection points may be agreed. These must be obtained from the specific dimension sheet for the order.

**Explanation**

1. Gear unit intake connection
2. Pump / cooling system intake connection
3. Cooling system pressure connection
4. Gear unit pressure connection
5. PT100 temperature monitoring (optional/recommended)
6. Cooling water connection

**Figure 14: Industrial gear unit with CS1-X and CS2-X cooling systems**
Figure 15: Hydraulic plan of industrial gear units with CS1-X and CS2-X cooling systems
3 Assembly instructions, storage, preparation, installation

3.15 Lubricant circulation (Option: LC, LCX)

DANGER  
Explosion hazard

Explosion hazard. Failure to comply is likely to cause severe or even fatal injuries.

- For operation in explosion hazard atmospheres, only approved and labelled circulation pumps and sensors may be used.
- The ATEX labelling must conform to the details of the system and/or machine design.

NOTICE!

Gear unit damage

The separate manufacturer’s documentation must be observed for assembly of the motor pump, the external cooling system and the sensors.

Flanged or motor pumps are used as standard for gear units with lubricant circulation. These are already installed on the gear unit on delivery and all lines are correctly connected.

The flange pump is driven via the gear unit drive shaft. Motor pumps have a separate drive.

Lubricant circulation systems are normally equipped with pressure switches. The connection and evaluation of these sensors must be ensured by the operator.

Information

Combination with external cooling units

In the case of combination of lubricant circulation with external cooling units the pressure and intake lines between the lubricant circulation and the cooling unit must be connected during the installation of the gear unit. The connection points should be obtained from the specific dimension sheet for the order.
### 3.16 Torque supports (Option: D, ED, MS)

**NOTICE!**

**Gear unit damage**

Failure to observe the following points may cause damage to the gear unit:

- 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.
- The torque support is not suitable for transferring transverse forces.

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 permissible.

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

![Figure 16: Permissible installation tolerances of the torque support (Option D and ED) (schematic diagram)](image)

**Explanation**

1. Fork head with bolt
2. Threaded bolt
3. Maintenance-free joint head
4. Fork plate with bolt

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 (7.4 "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.
3.17 Covering cap (Option: H, H66, FAN, MF.., MS...)  

**DANGER**  
Explosion hazard  
Explosion hazard due to damaged and rubbing covers. Failure to comply may cause severe or even fatal injuries.  

- Damaged covers must not be used, as they may cause rubbing.  
- Covers must be inspected for transportation damage e.g. dents and warping before they are fitted.

---

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

- Use a cover as a guard.  
- If adequate protection against contact cannot be achieved with a covering cap, the machine and plant constructor must ensure this by means of additional attachments.

---

All fastening bolts must be coated with a securing lubricant (e.g. Loctite 242, Loxeal 54-03) and tightened to the correct torque (7.4 “Torque values”).
3.18 Hubs on gear unit shafts

DANGER  Explosion hazard

Explosion hazard. Failure to comply is likely to cause severe or even fatal injuries.

- Care must be taken that drive and driven elements attached to the gear unit are also ATEX-compliant.

DANGER  Risk of 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.
- The drive unit must be secured against accidental start-up while the cover caps are removed.

NOTICE!  Gear unit damage

The separate manufacturer’s documentation for the hub must be observed for installation.

NOTICE!  Gear unit damage

Incorrect application of transverse forces may cause damage to the gear unit.

- The transverse force must be applied to the gear unit as closely as (see Figure 17).

Figure 17: Correct assembly of drive elements
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.

Information

Assembly

Use the end thread of the shafts for pulling. Assembly is facilitated by coating the hub with lubricant or heating it up to approx. 100 °C beforehand.

Figure 18: Example of a simple pulling device
3.18.1 Radial and axial forces

**Explosion hazard**

Explosion hazard. Failure to comply may cause severe or even fatal injuries.

Drive and driven elements may only be subjected to the maximum permitted radial and lateral forces $F_{R1}$ and $F_{R2}$ and axial forces $F_{A1}$ and $F_{A2}$ indicated on the rating plate 3.5 "Checking the type plate data".

- For drive shafts with free shaft ends – Option W – the maximum permissible transverse force $F_{R1}$ applies for the application of the transverse force to the centre of the free shaft journal (Figure 19).
- For output shafts, the application of the transverse force $F_{R2}$ must not exceed the dimension $x_{R2}$ (Figure 19).
- If the transverse force $F_{R2}$ for the output shaft is stated on the rating plate, but no dimension $x_{R2}$ is stated, the application of the force is assumed to be to the centre of the shaft journal (Figure 19).
- Observe the correct tension, particularly for belts and chains.
- Additional loads due to unbalanced hubs are not permitted.

![Figure 19: Permissible application of force to drive and driven shafts](image-url)
3.18.2 Drive coupling

Danger

Explosion hazard

Explosion hazard. Failure to comply is likely to cause severe or even fatal injuries.

- Only couplings which are approved and labelled for use in explosion hazard areas may be used. The ATEX labelling must conform to the details of the system and/or machine design.

Notice!

Gear unit damage

Gear units with drive couplings are pre-aligned prior to delivery.

- Check the alignment of the coupling with the aid of the separate manufacturer's documentation prior to commissioning.

3.18.2.1 Dog coupling

Normally, the gear unit is connected to the motor with a dog coupling. For gear units without an IEC/NEMA adapter, the alignment between the gear unit and the motor must be ensured by the operator and the coupling installed according to the manufacturer's instructions.

For gear units with IEC/NEMA adapters (see Section 3.9 "Motor (Option: IEC, NEMA)").
3.18.2.2 Turbo coupling

**WARNING**

Injury to persons

Failure to observe the following points may cause injury to persons:

- Danger of burns due to spun-off oil. In case of overload, the oil is drained off automatically during the rotation of the coupling. The coupling must be encased accordingly in order to channel oil which spins off.
- Connection of electrical components must be carried out by a qualified electrician.

Turbo couplings are usually supplied with a melting safety device. In case of overload the oil temperature in the coupling increases. As soon as the temperature limit (usually 140 °C) is reached the safety device melts and oil flows out of the motor and the coupling in order to separate the motor and the gear unit before both components are damaged.

It is recommended that an oil tray is provided for the turbo coupling in order to catch escaping oil. The quantity of oil in the coupling can be obtained from the manufacturer's documentation.

Such an oil tray is installed as standard for gear units on a motor swing base or base frame which are combined with a turbo coupling.

Optionally, turbo couplings can be equipped with a switching pin and a separate mechanical switch.

![Switching pin with separate mechanical switch](image)

**Figure 20: Switching pin with separate mechanical switch**

1. Switching pin protection
2. Mechanical switch
The triggering temperature of the switching pin is usually 120 °C. This ensures that the system is shut down before the temperature for the melting safety device is reached.

The alignment of the mechanical switch must be checked with the aid of the manufacturer's documentation prior to commissioning.

The switch must be connected to the evaluation electronics by the operator.

### Information

**Turbo couplings**

As standard, turbo couplings are usually supplied filled with oil.

### 3.18.2.3 Dog coupling

#### NOTICE!

**Gear unit damage**

Dog couplings require lubrication with grease to ensure wear-free function:

- Dog couplings must be re-greased according to the manufacturer's documentation prior to commissioning.

### 3.18.3 Output coupling

#### DANGER

**Explosion hazard**

Explosion hazard. Failure to comply is likely to cause severe or even fatal injuries.

- Only couplings which are approved and labelled for use in explosion hazard areas may be used. The ATEX labelling must conform to the details of the system and/or machine design.

#### NOTICE!

**Gear unit damage**

Failure to observe the following points may result in damage to the gear unit.

- The alignment of pre-mounted output couplings must be checked according to the manufacturer's documentation prior to commissioning.
- Output couplings which are supplied separately must be fitted and aligned according to the manufacturer's documentation.
### 3.19 Gear unit monitoring sensors

**DANGER**

Explosion hazard

Explosion hazard. Failure to comply is likely to cause severe or even fatal injuries.

- For operation in explosion hazard atmospheres, only sensors (PT100, pressure monitors, speed monitors, oil level monitors, vibration sensors, etc.) which have been approved and labelled for this purpose may be used.
- The ATEX labelling must conform to the details of the system and/or machine design.

**NOTICE!**

Sensors

The following points must be observed for the use of sensors for monitoring the gear unit:

- The separate manufacturer’s documentation must be observed for assembly.
- The position of the sensors must be obtained from the specific dimension sheet for the order.

### 3.20 Subsequent paintwork

**DANGER**

Explosion hazard

Explosion hazard. Failure to comply is likely to cause severe or even fatal injuries. Type and source of danger, consequences, measures to prevent danger:

- The painting of the gear unit is designed for Category II2G Group IIB (Zone 1 Group IIB). For use in Category 2G Group IIC (Zone 1 Group IIC) the gear unit must not be used or installed in areas in which processes which cause electrostatic charging are to be expected. This also includes occasional manual rubbing of the gear unit housing; cleaning may only be carried out with a cloth which is moistened with water.
- In case of subsequent painting it must be ensured that the paint has the same characteristics as the original paint. Failure to observe this results in the ATEX approval becoming void.

**NOTICE!**

Gear unit damage

For retrospective painting of the gear unit, the shaft sealing rings, rubber elements, pressure vent screws, hoses, type plates, adhesive labels and motor coupling components must not come into contact with paints, lacquers or solvents, as otherwise the components may be damaged or made illegible.
3.21 Temperature sticker

**DANGER**

Explosion hazard due to lack of labelling. Failure to comply may cause severe or even fatal injuries.

- With temperature class T4 gear units or gear units with a maximum surface temperature of less than 135 °C, the supplied self-adhesive temperature sticker (printed with value 121 °C) must be affixed to the gear unit housing (Part no. 8510400).

The temperature class or the maximum surface temperature can be seen from the ATEX labelling in the last line of the type plate.

Examples: II 2G c IIC T4 X or II 3D 125 C X

The temperature label must be attached in the area of the drive mount. For gear units with an IEC/NEMA adapter, the temperature label must be attached as for a helical gear unit.

*Figure 21: Position of the temperature label for helical and helical bevel gear units*
4 Commissioning

4.1 Oil level and venting

DANGER

Explosion hazard

Explosion hazard. Failure to comply is likely to cause severe or even fatal injuries.

- The oil level must be checked prior to commissioning (Section 5.2.7 "Oil level").
- Prior to commissioning, the vent must be checked and installed and/or unlocked as necessary.

NOTICE!

Gear unit damage

If the gear unit has already been filled with an initial filling prior to delivery, the vents must be fitted after installation.

Insufficient lubrication causes abnormal operation and damage to gear unit components.

The following table shows the usual fill levels of oil spaces on delivery:

<table>
<thead>
<tr>
<th>Oil space</th>
<th>Oil filling</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>with</td>
<td>Without</td>
</tr>
<tr>
<td>Industrial gear units</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Primary gear unit (Option: WG)</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Auxiliary gear unit (Option: WX)</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Connecting flange (Option: WX)</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Turbo coupling</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Oil tank (Option: OT)</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

Table 6: Oil spaces as delivered

The position of the vents can be obtained from the specific dimension sheet for the order or from Section 7.1 "Standard positions of the oil drain, vent and oil level". The sealing plug which is used for transport must first be removed and the vent installed in the same position.

Information

Vent position

With the use of pressure vent (Option: DR) this must be unlocked for auxiliary (Option: WX) and first stage gear units (Option: WG) prior to commissioning according to the operating and installation instructions B 2000.

The sealing plug which is used to close the vent hole for transport is marked with red paint.

The connecting flange between the industrial gear unit and the auxiliary gear unit is always equipped with a pressure venting device. This device, as well as the pressure venting device on the industrial gear unit (only for ATEX-certified gear units) must be unlocked as shown unterhalb.
Locked

Explanation
1 Vent screw
2 Transport securing device

Unlocked

Figure 22: Activation of the pressure vent
4.2 Lubricant circulation (Option: LC, LCX)

DANGER

Explosion hazard. Failure to comply is likely to cause severe or even fatal injuries. Type and source of danger, consequences, measures to prevent danger:

- The drive unit may only be commissioned after the pump and the sensors for the circulation lubrication have been connected and commissioned.
- During operation, the function of the lubricant circulation must be ensured by means of a monitoring system.
- The gear unit must be shut down immediately in case of failure of the lubrication circulation.
- For operation in explosion hazard atmospheres, only approved and labelled circulation pumps and sensors may be used.
- The ATEX labelling must conform to the details of the system and/or machine design.

All gear units equipped with lubricant circulation are usually equipped with a pressure switch to monitor the pump function. The connection of the pressure switch and the evaluation of the signal must be carried out by the operator. The pressure switch must be connected so that operation is only possible if the oil pump has built up pressure. If the pre-set pressure is undershot, the applied electric signal is interrupted by the pressure switch.

Information

Lubricant circulation

- If pressure circulation lubrication is used, the operational viscosity of the gear oil on start-up must not exceed 1800 cSt. For ISO-VG220 this corresponds to a temperature of at least 10 °C for mineral oil, and a temperature of at least 0 °C for synthetic oil.
- The pressure monitor can only be evaluated after the pump has been put into operation, as a pressure must first be built up.
- During commissioning, a lower pressure is permissible for a short period.
- The pressure monitor is usually set to 0.5 bar.
4.3 Gear unit cooling with fan (Option: FAN)

**DANGER**

**Explosion hazard**

Failure to comply is likely to cause severe or even fatal injuries.

- Check the contact guard for damage (e.g. due to incorrect transportation or installation). Repair any damage prior to commissioning.
- Objects must not be inserted into the air intake openings in order to prevent collision with the fan blades and resultant spark production.
- An adequate supply of air must be ensured by means of a minimum free space of 30° ahead of the air intakes. The air inlet grille and the fan blades must be kept clean.

**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 supply of air must be ensured by means of a minimum free space of 30° ahead of the air intakes. The air inlet grille and the fan blades must be kept clean.
- For ribbed gear unit housings, special care must be taken that the spaces between the ribs are cleaned at regular intervals to prevent deposits of dust or dirt.

**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.

The main direction of rotation was specified in the planning phase and can be obtained from the specific dimension sheet for the order.

The opposite direction of rotation is also permissible. However, in this case the fan does not provide cooling, so that the calculated heating power of the gear unit cannot be complied with.
4.4 Internal cooling system (Option: CC)

Explosion hazard

Explosion hazard. Failure to comply is likely to cause severe or even fatal injuries.

- 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 temperature of the cooling fluid and the cooling fluid flow rate must be monitored and ensured by the operator.
- If there is a danger of frost the operator should add a suitable anti-freeze solution to the cooling water.
- Use of a resistance thermometer (PT100) is mandatory. The customer must connect the thermometer to an evaluation device which gives a warning signal above 80 °C.
- The special ATEX documentation provided by NORD must be observed.
- The ATEX approval is void if these instructions are not observed!

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 (2D/2G: 2 bar). The necessary quantity of coolant is 10 l / min. The maximum permissible coolant temperature is defined during the planning phase and can be found in the order data.

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

4.5 External cooling system (Option: CS1-X, CS2-X)

⚠️ DANGER

Explosion hazard

Explosion hazard. Failure to comply is likely to cause severe or even fatal injuries.

- When commissioning the cooling system, the operating instructions of the cooling unit must be observed.
- The drive unit may only be commissioned after the cooling unit has been connected and commissioned.
- For oil / water coolers (Option: CS1) the temperature of the cooling fluid and the cooling fluid flow rate must be monitored and ensured by the operator.
- If there is a danger of frost the operator should add a suitable anti-freeze solution to the cooling water.
- For oil / water coolers (Option: CS2) an adequate air intake must be ensured. A free space of at least 30° must be provided for the air intake. The air inlet grille and the fan blades must be kept clean. The option is only approved for Categories 2G and 3D/3G.
- Use of a resistance thermometer (PT100) is mandatory. The customer must connect the thermometer to an evaluation device which gives a warning signal above 80 °C for temperature class T3 and shuts the drive down with temperature class T4.
- For use in an explosive atmosphere, only cooling units which have been appropriately approved and labelled may be used. The ATEX labelling must conform to the details of the system or machine design.
- The ATEX approval is void if these instructions are not observed!

The system 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 cooling.

For oil / water coolers (Option: CS1) the maximum permissible cooling water intake temperature is defined during the planning phase and can be obtained from the data for the order.

ℹ️ Information

Cooling system

It is recommended that the cooling unit is only switched on above an oil temperature of 60 °C and switched off below an oil temperature of 45 °C.
4.6 Temperature monitoring (Option: PT100)

DANGER

Explosion hazard

Explosion hazard Failure to comply is likely to cause severe or even fatal injuries.

- Individual monitoring elements are not interlocked by NORD. The operator is responsible for implementing this interlock! Unless they are interlocked, each of the devices can trigger an alarm.
- For use of an internal or external cooling system, temperature monitoring with a resistance thermometer (Option: PT100) is mandatory. The customer must connect the resistance thermometer to an evaluation device. Regardless of the type of oil, gear units with ATEX certification must issue a warning signal above a temperature of 80 °C (T3) or shut down the drive (T4).
- For use in an explosive atmosphere, only temperature monitoring systems which have been approved and labelled may be used in explosive atmospheres.
- The ATEX labelling must conform to the details of the system and/or machine design.
- A regular function check is necessary.

The PT100 is an electrical resistor with which the oil temperature can be monitored. The electrical resistance depends on the oil temperature. The PT100 must be connected to a suitable evaluation device and the signal must be evaluated. The gear unit must be shut down if the permissible oil temperature is exceeded.

The triggering device must be set so that the drive unit is shut down when the maximum permissible oil temperature is reached.

For mineral oil, the maximum permissible oil temperature is 85 °C.

For synthetic oil, the maximum permissible oil temperature is 105 °C.
4.7 Backstop / freewheeling coupling (Option: R, WX)

Explosion hazard

Explosion hazard Failure to comply is likely to cause severe or even fatal injuries.

- The auxiliary drive must be secured or monitored to prevent it from idling.
- The operator is responsible for the correct connection and evaluation of the speed sensor.
- For use in an explosive atmosphere, only speed sensors which have been appropriately approved and labelled may be used.
- The ATEX labelling must conform to the details of the system and/or machine design.
- Idling wear occurs if the minimum drive speed or lift off speed of the back stop is undershot.
- Note the minimum speed for release of the back stop as well as the maximum speed. Speeds which are too low cause increased wear and temperature increases. Excess speeds will damage the back stop.

Optional backstops, which only allow rotation in one direction and block the other direction of rotation are available for attachment to the gear unit. For auxiliary gear units (Option: WX) the backstop is used for freewheeling, in order to allow the gear unit to run at low speeds, e.g. for maintenance work.

The backstop or freewheeling coupling is lubricated with the gear oil. The backstops or the freewheeling coupling lift off due to centrifugal force above a certain lifting-off speed \( n_1 \) (see Table 7 and Table 8). For the freewheeling coupling the auxiliary drive must be at a standstill. Monitoring of the freewheeling coupling can be carried out with a speed sensor.

In continuous operation backstops and freewheeling couplings should only be operated above the lift-off speed in order to minimise wear and generation of heat.

The direction of rotation of the backstop and the freewheeling coupling are marked with an adhesive label on the gear unit. The main direction of rotation was specified in the planning phase for the gear unit and can also be obtained from the specific dimension sheet for the order.

Figure 23: Industrial gear unit with backstop (schematic diagram)
<table>
<thead>
<tr>
<th>Gear units</th>
<th>Stages</th>
<th>Nominal gear ratio i&lt;sub&gt;N&lt;/sub&gt;</th>
<th>Lift-off speed n&lt;sub&gt;L&lt;/sub&gt; [rpm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>SK 5207</td>
<td>2</td>
<td>7.1</td>
<td>430</td>
</tr>
<tr>
<td>SK 5307</td>
<td>3</td>
<td>28</td>
<td>670</td>
</tr>
<tr>
<td>SK 5407</td>
<td>3</td>
<td>18</td>
<td>671</td>
</tr>
<tr>
<td>SK 5507</td>
<td>4</td>
<td>112</td>
<td>1088</td>
</tr>
<tr>
<td>SK 6207</td>
<td>2</td>
<td>8.0</td>
<td>2740</td>
</tr>
<tr>
<td>SK 6307</td>
<td>3</td>
<td>20</td>
<td>430</td>
</tr>
<tr>
<td>SK 6407</td>
<td>3</td>
<td>28</td>
<td>1088</td>
</tr>
<tr>
<td>SK 6507</td>
<td>4</td>
<td>125</td>
<td>1759</td>
</tr>
<tr>
<td>SK 7207</td>
<td>2</td>
<td>7.1</td>
<td>400</td>
</tr>
<tr>
<td>SK 7307</td>
<td>2</td>
<td>28</td>
<td>430</td>
</tr>
<tr>
<td>SK 7407</td>
<td>3</td>
<td>15</td>
<td>624</td>
</tr>
<tr>
<td>SK 7507</td>
<td>4</td>
<td>112</td>
<td>1759</td>
</tr>
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<td>SK 8207</td>
<td>2</td>
<td>8</td>
<td>400</td>
</tr>
<tr>
<td>SK 8307</td>
<td>3</td>
<td>32.5</td>
<td>430</td>
</tr>
<tr>
<td>SK 8407</td>
<td>3</td>
<td>20</td>
<td>624</td>
</tr>
<tr>
<td>SK 8507</td>
<td>4</td>
<td>125</td>
<td>1759</td>
</tr>
<tr>
<td>SK 9207</td>
<td>2</td>
<td>7.1</td>
<td>320</td>
</tr>
<tr>
<td>SK 9307</td>
<td>3</td>
<td>28</td>
<td>400</td>
</tr>
<tr>
<td>SK 9407</td>
<td>3</td>
<td>18</td>
<td>499</td>
</tr>
<tr>
<td>SK 9507</td>
<td>4</td>
<td>112</td>
<td>1309</td>
</tr>
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<td>SK 10207</td>
<td>2</td>
<td>8</td>
<td>320</td>
</tr>
<tr>
<td>SK 10307</td>
<td>3</td>
<td>31.5</td>
<td>400</td>
</tr>
<tr>
<td>SK 10407</td>
<td>3</td>
<td>20</td>
<td>499</td>
</tr>
<tr>
<td>SK 10507</td>
<td>4</td>
<td>125</td>
<td>1309</td>
</tr>
</tbody>
</table>

Table 7: Backstop lift-off speeds SK 5..07 – SK 10..07
<table>
<thead>
<tr>
<th>Gear units</th>
<th>Stages</th>
<th>Nominal gear ratio $i_N$</th>
<th>Lift-off speed $n_1$ [rpm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>SK 11207</td>
<td>2</td>
<td>5.6</td>
<td>20</td>
</tr>
<tr>
<td>SK 11307</td>
<td>3</td>
<td>22.4</td>
<td>28</td>
</tr>
<tr>
<td>SK 11407</td>
<td>3</td>
<td>31.5</td>
<td>45</td>
</tr>
<tr>
<td>SK 11507</td>
<td>4</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td>SK 12207</td>
<td>2</td>
<td>5.6</td>
<td>20</td>
</tr>
<tr>
<td>SK 12307</td>
<td>3</td>
<td>22.4</td>
<td>112</td>
</tr>
<tr>
<td>SK 12407</td>
<td>3</td>
<td>31.5</td>
<td>45</td>
</tr>
<tr>
<td>SK 12507</td>
<td>4</td>
<td>80</td>
<td>400</td>
</tr>
<tr>
<td>SK 13207</td>
<td>2</td>
<td>5.6</td>
<td>20</td>
</tr>
<tr>
<td>SK 13307</td>
<td>2</td>
<td>22.4</td>
<td>112</td>
</tr>
<tr>
<td>SK 13407</td>
<td>3</td>
<td>31.5</td>
<td>45</td>
</tr>
<tr>
<td>SK 13507</td>
<td>4</td>
<td>80</td>
<td>400</td>
</tr>
<tr>
<td>SK 14207</td>
<td>2</td>
<td>7.1</td>
<td>25</td>
</tr>
<tr>
<td>SK 14307</td>
<td>3</td>
<td>28</td>
<td>140</td>
</tr>
<tr>
<td>SK 14407</td>
<td>3</td>
<td>45</td>
<td>56</td>
</tr>
<tr>
<td>SK 14507</td>
<td>4</td>
<td>100</td>
<td>400</td>
</tr>
<tr>
<td>SK 15207</td>
<td>2</td>
<td>5.6</td>
<td>20</td>
</tr>
<tr>
<td>SK 15307</td>
<td>3</td>
<td>22.4</td>
<td>112</td>
</tr>
<tr>
<td>SK 15407</td>
<td>3</td>
<td>12.5</td>
<td>28</td>
</tr>
<tr>
<td>SK 15507</td>
<td>4</td>
<td>80</td>
<td>400</td>
</tr>
</tbody>
</table>

Table 8: Backstop lift-off speeds SK 11..07 – SK 15..07
Table 9: Backstop lift-off speeds SK 5..17 – SK 11..17

The bearing life of the backstop is reduced if the necessary lift-off speeds are undershot. Contact NORD for further information.
4.8 Checking the gear unit

**DANGER**

Explosion hazard

Explosion hazard **Failure to comply is likely to cause severe or even fatal injuries.**

- The drive must be shut down immediately if abnormalities are detected in the inspections described below. Contact the NORD Service department for advice.

During commissioning of the gear unit a test run should be carried out in order to detect any problems prior to continuous operation.

**During a test run under maximum load, the gear unit should be checked for:**

- Unusual noises, such as grinding, knocking or rubbing noises
- Unusual vibrations, oscillations or other movements
- Production of steam or smoke

After the test run, the gear unit should be checked for:

- Leaks
- Slippage of the shrink disks:
  
  For this, the cover should be removed and a check carried out as to whether the marking (3.10.2 "Hollow shaft with shrink disc element (Option: S)") shows a relative movement of the hollow shaft of the gear unit and the machine shaft. After this, the cover must be re-fitted (5.2.5 "Covering cap and attachment adapter (only for 2D)").

**Information**

**Apparent leakage**

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.

See also Section 7.7 "Leakage and leak-tightness"
4.9 Temperature measurement

**DANGER**

Explosion hazard Failure to comply is likely to cause severe or even fatal injuries.

- During commissioning, a surface temperature measurement of the gear unit must be made under maximum load. (This does not apply to gear units which are labelled as temperature class T1 – T3 or a maximum surface temperature of 200 °C in the last line of the type plate.)

The details of the ATEX temperature class or the maximum surface temperature are based on normal installation conditions 3.7 "Preparing for installation". Even small changes to the installation conditions can have a significant effect on the temperature of the gear unit.

For the temperature measurement, a normal temperature measuring device is required, with a measurement range from 0 °C to 130 °C and a precision of at least ± 4 °C. The device must at least enable measurement of the surface temperature and the temperature of the air.

Temperature measurement procedure:

1. Allow the gear unit to run at maximum speed under maximum load for approx. 4 hours.

2. Following warm-up, the temperature of the gear unit housing surface $T_{gm}$ is to be measured close to the temperature sticker 5.2.13 "Temperature sticker (only for T4 or T < 135 °C)".

3. Measure the temperature of the air $T_{um}$ in the immediate vicinity of the gear unit.
**DANGER**

**Explosion hazard**

Explosion hazard Failure to comply is likely to cause severe or even fatal injuries.

- The gear unit must be shut down and Getriebebau NORD must be consulted if any of the following criteria do not apply:

  - The measured air temperature $T_{um}$ is within the permissible range stated on the type plate.
  
  - The measured temperature of the surface of the gear unit housing $T_{gm}$ is below 121 °C and the temperature indication label has not turned black (see Figure 25).
  
  - The measured temperature of the surface of the gear unit housing plus the difference between the highest permissible air temperature $T_u$ stated on the type plate and the measured air temperature must be at least 15 °C lower than the maximum permissible surface temperature, i.e.:

<table>
<thead>
<tr>
<th>ATEX labelling:</th>
<th>II 2G Ex h IIIC T4 Dc / II 3G Ex h IIICT4 Gc or II 2G c T4 / II 3G T4:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$T_{gm} + T_u - T_{um} &lt; 135 °C – 15 °C</td>
</tr>
<tr>
<td>ATEX labelling:</td>
<td>II 2D Ex h IIIC $T_{max}$ Db / II 3D Ex h IIIC $T_{max}$:Dc or II 2D $T_{max}$ / II 3D $T_{max}$:</td>
</tr>
<tr>
<td></td>
<td>$T_{gm} + T_u - T_{um} &lt; T_{max} – 15 °C</td>
</tr>
</tbody>
</table>

$T_{gm}$: Measured temperature of the surface of the gear unit housing in °C

$T_{um}$: Measured air temperature in °C

$T_{max}$: Maximum surface temperature according to gear unit type plate (ATEX labelling) in °C

$T_u$: Upper value of the permissible ambient temperature range in °C according to the type plate

**Figure 24: ATEX labelling**

Centre dot is **white**: OK

Centre dot is **black**: Temperature was too high.

**Figure 25: Temperature sticker**
4.10 Operation in explosion hazard areas

DANGER

Explosion hazard

Explosion hazard Failure to comply is likely to cause severe or even fatal injuries.

• When operating the gear unit, the instructions in this operating manual must be complied with.
• The prescribed inspection and servicing intervals must be complied with.
• It must be ensured that the power ratings stated on the type plate are not exceeded. If there are several operating points, e.g. for variable speed drives,
  – the maximum drive power P1,
  – the maximum permissible torque on the gear unit output shaft M2 or
  – the maximum permissible speed
  must not be exceeded in any operating point. Overload of the gear unit must be ruled out.
• If the gear unit is equipped with a cooling coil, it may only be put into operation after the cooling coil has been connected to the cooling circuit and the cooling circuit is in operation. The temperature and flow rate of the cooling fluid must be monitored and ensured by the operator.
• If the gear unit is equipped with a cooling system, the gear unit may only be commissioned after the cooling system has been connected and commissioned. The temperature of the air or cooling fluid and the cooling fluid flow rate must be monitored and ensured by the operator.
• The painting of the gear unit is designed for Category II2G Group IIB (Zone 1 Group IIB). Use in Category 2G Group IIC (Zone 1 Group IIC) is only permissible on condition that no processes occur in which electrical charge is generated. Electrical charge can occur even with occasional manual rubbing of the gear unit housing. For example, cleaning must only be carried out with a cloth which is moistened with water.
• The gear unit must be shut down immediately if the temperature sticker turns black or other abnormalities occur (see also Section 4.8 "Checking the gear unit"). Contact the NORD Service department for advice.
## 4 Commissioning

### 4.11 Checklist

#### 4.11.1 Obligatory

<table>
<thead>
<tr>
<th>Subject of test</th>
<th>Date checked:</th>
<th>Information see Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is any transportation damage or damage apparent?</td>
<td></td>
<td>3.1</td>
</tr>
<tr>
<td>Does the labelling on the type plate conform to the specifications?</td>
<td></td>
<td>3.5</td>
</tr>
<tr>
<td>Does the required configuration conform with the actual installation?</td>
<td></td>
<td>7.2</td>
</tr>
<tr>
<td>Has the correct oil level for the version been checked?</td>
<td></td>
<td>5.2.7</td>
</tr>
<tr>
<td>Has the vent been fitted and activated?</td>
<td></td>
<td>7.1</td>
</tr>
<tr>
<td>Is the gear unit earthed?</td>
<td></td>
<td>3.8</td>
</tr>
<tr>
<td>Is the gear unit correctly aligned?</td>
<td></td>
<td>3.8</td>
</tr>
<tr>
<td>Is the gear unit installed without tension?</td>
<td></td>
<td>3.8</td>
</tr>
<tr>
<td>Are the external gear shaft forces within the permitted limits?</td>
<td></td>
<td>3.18.1</td>
</tr>
<tr>
<td>Is the coupling between the gear unit and the motor correctly installed?</td>
<td></td>
<td>3.18.2</td>
</tr>
<tr>
<td>Has the gear unit been checked with a test run?</td>
<td></td>
<td>4.8</td>
</tr>
<tr>
<td>Does the motor also have appropriate ATEX approval?</td>
<td></td>
<td>3.9</td>
</tr>
<tr>
<td>Do all drive and driven elements have appropriate ATEX approval?</td>
<td></td>
<td>3.18</td>
</tr>
<tr>
<td>Do all electrical components have appropriate ATEX approval?</td>
<td></td>
<td>4.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.7</td>
</tr>
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</table>
### 4.11.2 Optional

<table>
<thead>
<tr>
<th>Subject of test</th>
<th>Checklist</th>
<th>Date checked</th>
<th>Information see Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option R, WX, FAN:</td>
<td>Is the direction of rotation specified and checked?</td>
<td></td>
<td>4.3</td>
</tr>
<tr>
<td>Option D and ED:</td>
<td>Is the torque support correctly fitted?</td>
<td></td>
<td>3.16</td>
</tr>
<tr>
<td>Option AS, FAN:</td>
<td>Are contact guards fitted to rotating components?</td>
<td></td>
<td>3.17</td>
</tr>
<tr>
<td>Option FAN, CS2:</td>
<td>Is an adequate supply of air ensured?</td>
<td></td>
<td>4.3</td>
</tr>
<tr>
<td>Option CS1, CC:</td>
<td>Is the cooling water or the cooling coil connected to the cooling unit and open?</td>
<td></td>
<td>4.5</td>
</tr>
<tr>
<td>Option CS1, CS2:</td>
<td>Is the cooling unit connected to the gear unit?</td>
<td></td>
<td>4.5</td>
</tr>
<tr>
<td>Option: LC:</td>
<td>Has the pressure switch been functionally connected?</td>
<td></td>
<td>4.2</td>
</tr>
<tr>
<td>Option PT100:</td>
<td>Has the temperature monitor been functionally connected?</td>
<td></td>
<td>4.6</td>
</tr>
<tr>
<td>Option AS:</td>
<td>Has the shrink disk connection been checked for slippage?</td>
<td></td>
<td>3.10.2</td>
</tr>
<tr>
<td>Option WX:</td>
<td>Has the speed monitor been functionally connected?</td>
<td></td>
<td>4.7</td>
</tr>
<tr>
<td>ATEX T4 or T &lt; 135 °C:</td>
<td>Is the temperature sticker affixed and has not turned black?</td>
<td></td>
<td>3.21</td>
</tr>
<tr>
<td>ATEX T4 or T &lt; 135 °C:</td>
<td>Has the temperature measurement been carried out?</td>
<td></td>
<td>4.9</td>
</tr>
</tbody>
</table>
5 Service and maintenance

5.1 Service and Maintenance Intervals

<table>
<thead>
<tr>
<th>Service and Maintenance Intervals</th>
<th>Service and maintenance work</th>
<th>Information see Section</th>
</tr>
</thead>
</table>
| According to manufacturer's details | • Option PT100: Check the function and measurement accuracy; recalibrate as necessary  
• Option LC: Check the function and measurement accuracy of the pressure monitor, recalibrate as necessary  
• Option CS1: Service the oil / water cooler  
• Option CS2: Service the oil / air cooler  
• Couplings: Service the drive and output couplings | Manufacturer's documentation |
| Standstill/Storage > 6 months | • Regularly check the protective coating on unpainted surfaces as well as the painting  
• Check the condition of the oil  
• Check the seals | 3.3 |
| Every 100 operating hours, but at least weekly | • Visual inspection for leaks  
• Check the gear unit for unusual running noises and vibrations | 5.2.1  
5.2.2 |
| After 500 operating hours | • First oil change after commissioning | 5.2.15 |
| At least once per month | • Option FAN: Check the air cooler for dirt and dirt deposits  
• Option CS2: Check the air heat exchanger unit for dirt and dirt deposits  
• Check the covers and the attachment adapters for dirt and dirt deposits | 5.2.3  
5.2.4  
5.2.3 |
### Service and Maintenance Intervals

<table>
<thead>
<tr>
<th>Service and Maintenance Intervals</th>
<th>Service and maintenance work</th>
<th>Information see Section</th>
</tr>
</thead>
</table>
| Every 2500 operating hours, but at least every six months | • Visual inspection of shaft sealing ring  
• Check the oil level and oil condition  
• Clean or replace the vent  
• Option D, ED: Visual inspection of the rubber buffers  
• Option LC, LCX, CS1, CS2, OT: Visual inspection of hoses and pipes  
• Option CS1, CS2, LC/LCX: Check the oil filter  
• Option VL2/3/4/6 KL2/3/4/6: Re-lubricate the bearings in the output flange and remove excess grease  
• ATEX T4 or T < 135 °C: Visual inspection of temperature sticker  
• ATEX 2D/3D: Remove dust | 5.2.6  
5.2.7  
5.2.8  
5.2.9  
5.2.10  
5.2.11  
5.2.12  
5.2.13  
5.2.14 |
| For operating temperatures up to 80 °C:  
  Every 10000 operating hours, but at least every 2 years | • Replace shaft sealing rings if worn  
• Oil change (the interval is double for filling with synthetic products) reduction of the lubricant change interval for extreme operating conditions (high humidity, aggressive environments and large temperature fluctuations)  
• Option CS1, CS2, LC/LCX: Replace the oil filter  
• Option CC: Check the cooling coil for deposits (fouling) | 5.2.6  
5.2.15  
5.2.11  
5.2.16 |
| Higher temperatures reduce the oil change intervals | • Re-grease the bearings in the gear unit (only for SK5..07 – SK6..07 and installation position M5/M6)  
• Option LC/LCX, CS1, CS2, OT: Replace hose lines  
• ATEX 2GD: Check the function of the resistance thermometer  
• ATEX 2GD: Check the function of the pressure switch (only 2GD) | 5.2.17  
5.2.10  
5.2.18  
5.2.18 |
| Every 20000 operating hours, but at least every 4 years | • General overhaul | 5.2.19 |
| According to the interval specified in field MI of the type plate (Only for Category 2G and 2D) or At least every 10 years | | |

**Table 10: Service and Maintenance Intervals**
5.2 Service and maintenance work

**DANGER**  
Explosion hazard

Explosion hazard. Failure to comply is likely to cause severe or even fatal injuries.

- No explosive atmosphere must be present during servicing and repair work.
- Servicing and maintenance work must only be performed by qualified specialist personnel.
- When cleaning the surface of the gear unit, do not use and procedures or materials, which could cause electrostatic charging of the surface of the gear unit.

**WARNING**  
Severe personal injury

Personal injury due to rapidly rotating machine components.

- Installation and maintenance work must only be performed when the gear units are at a standstill. 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 when cleaning with compressed air or a pressure washer.

**WARNING**  
Danger of burns

The surfaces of gear units or geared motors may be hot during or shortly after operation. In addition there is a danger of burns due to hot fluids.

- Installation and maintenance work must only be performed when gear unit has cooled down.
- Wear protective gloves.
- Shield hot surfaces with contact guards.

**NOTICE!**  
Gear unit damage

Take care that no dirt or water enters the shaft sealing rings or the vents when cleaning.

- Dirt or water on shaft sealing rings may cause them to fail.
- Vents which are clogged with dirt prevent equalisation of pressure. For example, this results in faster wear of the shaft sealing rings.
5.2.1 Visual inspection

The gear unit must be checked for leaks. Attention should be paid to escaping gear oil and traces of oil on the exterior or underneath the gear unit. In particular, the radial seals, cover caps, screw plugs, hoses and housing joints should be checked.

If leaks are suspected, the gear unit should be cleaned, the oil level checked (5.2.7 "Oil level") and checked again for leaks after approx. 24 hours. If a leak is confirmed (dripped oil), the gear unit must be repaired immediately. Please contact the NORD Service department.

---

5.2.2 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 unit must be repaired immediately. Please contact the NORD Service department.

---

5.2.3 Gear unit cooling with fan (Option: FAN)

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 4.3 "Gear unit cooling with fan (Option: FAN)".

---

5.2.4 Heat exchanger (Option CS2)

The heat exchanger of the oil/air cooling unit must be cleaned regularly in order to preserve the efficiency of the unit.

---

5.2.5 Covering cap and attachment adapter (only for 2D)

For gear units with cover caps (Option: H) the cover cap must be removed in case of severe soiling. Dust deposits in the cover cap, on the output shaft and on the shrink disk must be removed. After this, the cover must be re-fitted (Section 3.17 "Covering cap (Option: H, H66, FAN, MF..., MS...)”).

If the interior of the IEC/NEMA adapter is severely soiled, the motor must be removed and the dust deposits removed from the interior and the coupling.

Then fit the motor as described in Section 3.9 "Motor (Option: IEC, NEMA)".

---

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.
5.2.6 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 (7.7 "Leakage and leak-tightness”)

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 - Klüber Lubrication (7.3.1 "Roller bearing greases")

Take care that after fitting, the new shaft sealing ring does not run in the old wear track.

---

**Information**

Replacement of MSS7 seals:

MSS7 seals are two-part seals which consist of a liner with an axial dust lip and a radial shaft sealing ring with a radial dust lip (unterhalb). Special installation rules must be observed when replacing these seals in order to achieve a normal operating life. Please contact the NORD Service department in case of any queries.
5.2.7 Oil level

The installation position must comply with the version on the type plate.

---

**DANGER**

**Explosion hazard**

Failure to comply is likely to cause severe or even fatal injuries.

- The oil level may only be checked when the gear unit is at a standstill and has cooled down. The oil temperature should be between 20 °C and 40 °C. The gear unit must be secured to prevent accidental activation.

---

With double gear units and gears with auxiliary drive (Option: WX) the oil level must be checked on both gear units. For auxiliary drives with freewheeling couplings the oil level in the attachment cylinder must also be checked.

Oil level checks and top-ups may be necessary for attached couplings. In this case, the manufacturer's documentation must be observed.

If necessary, the oil level must be corrected with the type of oil which is stated on the type plate, or the appropriate quantity of oil must be drained off.

If possible, filling should be carried out via the vent position.

The positions of the oil measuring device, the vent and the oil drain can be obtained from the specific dimension sheet for the order.

---

5.2.7.1 Oil level screw

1. The corresponding oil level screw must be screwed out.
2. Check the oil level in the gear unit with the dipstick supplied (Part No.: 2830050), as shown in Fig. 21. To do this, the part of the dipstick which is submerged in the oil must be held vertically. The maximum oil level is the lower edge of the oil level hole. The minimum oil level is approx. 4 mm below the lower edge of the oil level hole. The dipstick then just dips into the oil.
3. If the integrated seal of the 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.
4. Fit the oil level screw together with the sealing ring and tighten to the correct torque (See Section 7.4 "Torque values").
5.2.7.2 Oil inspection glass/oil level glass (Option: OSG), Oil level indicator (Option: OST)

The oil level can be seen directly in the window. The correct oil level is the middle of the inspection glass. For the oil level indicator version, the oil level must be in the middle.

5.2.7.3 Oil dipstick (Option: PS)

1. Unscrew the dipstick from the gear unit and wipe it with a clean cloth.
2. Fully insert the dipstick into the gear unit and unscrew it again.
3. The oil level must be between the upper and lower marking.
5.2.7.4 Oil level tanks (Option: OT)

a. Oil level tank and dipstick (standard configuration) (characteristic: cylindrical container): The oil level must be checked with the aid of the dipstick plug (thread G1¼) in the oil tank. The sequence is as described in the previous section.

b. Oil level tank and Oil level indicator (standard configuration)(characteristic: rectangular container): The oil level can be seen directly in the window. The correct oil level is the middle of the oil level indicator.

After correction of the oil level, unscrewed oil level screws, dipsticks, vents and oil drain screws which have been unscrewed must be screwed in again and tightened with the appropriate torques (see Section 7.4 “Torque values”).

5.2.8 Venting

5.2.8.1 Vent filter (Option: FV)

The standard ventilation filter uses a wire mesh as the filter material. The filter cannot be cleaned and must therefore be completely replaced.

1. Unscrew the old ventilation filter
2. Screw in the new ventilation filter with a new sealing ring (7.4 "Torque values")

Figure 29: Vent filter (Option FV)
5.2.8.2  Cellulose filter (Option: EF)

**DANGER**  
Explosion hazard

Failure to comply is likely to cause severe or even fatal injuries.  
- The separate filter manufacturer's documentation must be observed for installation.

**Information**  
ATEX conformity

The fan with filter element (option EF) is only permissible for ATEX 3D.

This filter uses cellulose as the filter material. The filter insert is replaceable.

1. Unscrew the cap of the filter insert
2. Remove and check the filter element
3. Optional: Replace the filter element in case of contamination
4. Insert the filter insert
5. Put on the cover and tighten finger-tight

![Cellulose filter (Option EF)](image)

Figure 30: Cellulose filter (Option EF)

5.2.8.3  Pressure venting (Option: DR)

The pressure venting only releases excess pressure from the gear unit. Ambient air cannot enter the gear unit via the pressure vent. Because of this, the pressure vent is not equipped with filter material.

1. Unscrew the pressure vent screw from the gear unit
2. Thoroughly clean the vent (e.g. with compressed air)
3. Perform a function test
4. Optional: Replace the pressure vent screw
5. Screw the pressure vent screw into the gear unit together with a new sealing ring (7.4 "Torque values")
5.2.9 Rubber buffer (Option: ED)

Gear units with an elastic torque support (Option ED) have rubber elements. If these show damage such as tears to the rubber surface, the elements must be replaced. In this case, please contact NORD Service.

5.2.10 Piping

5.2.10.1 Piping (Option: LC, LCX, OT)

The piping of lubrication circulation systems or vent lines for full oil level in combination with oil level tanks must be checked for leaks. The affected pipes must be replaced in case of leaks. In this case, please contact NORD Service.

5.2.10.2 Hose lines (Option: LC, LCX, CS1, CS2, OT)

**Explosion hazard**

DANGER

Failure to comply is likely to cause severe or even fatal injuries.

- Always use electrically conducting hoses in order to prevent electrical charging due to friction between the oil and the hose line.

Hose lines are used as intake and pressure lines for lubricant circulation and for cooling units. In addition, if an oil tank is present, this is connected to the gear unit with hose lines. Hose lines are subjected to a natural ageing process due to external influences (e.g. UV radiation) to a greater extent than pipes.

When checking hose lines, look out for leaks, cuts, cracks, porous areas and chafing. In such cases, the affected hose lines must be replaced. Please contact the NORD Service department.
5.2.11 Oil filter (Option: CS1-X, CS2-X, LC/LCX)

**DANGER**

Explosion hazard

Failure to comply is likely to cause severe or even fatal injuries.

- The separate filter manufacturer’s documentation must be observed for installation.

As standard, the oil filter is equipped with a visual contamination indicator. It is recommended that the filter element is replaced at the latest after an operating period of one year. The filter element must be replaced immediately if the contamination indicator triggers. Refer to the relevant manufacturer's documentation for further information.

5.2.12 Bearings is the output flange (Option: VL2/3/4/6, KL2/3/4/6)

For agitator version gear units, re-lubrication of the bearing in the output flange is necessary. Before re-lubrication, the grease nipple opposite to the sealing plug must be unscrewed. Grease should be injected until a quantity of 25 g escapes from the sealing plug. After this, the sealing plug must be reinserted and tightened. Remove excess grease. Recommended grease: Petamo GHY 133N - Klüber Lubrication (7.3.1 "Roller bearing greases").

5.2.13 Temperature sticker (only for T4 or T < 135 °C)

Check whether the temperature sticker has turned black (3.21 "Temperature sticker"). If the temperature sticker has turned black, the gear unit has become too hot. In this case operation of the gear unit must be discontinued immediately.

The cause of overheating must be established. Please contact the NORD Service department. The drive unit must not resume operation before the cause of overheating has been remedied and renewed overheating can be ruled out.

Before once more putting into operation, a new temperature-resistant adhesive label must be attached to the gearbox (3.21 "Temperature sticker").
5.2.14 Remove dust

**DANGER**

Explosion hazard

Failure to comply is likely to cause severe or even fatal injuries.

- Overheating of the gear unit due to reduced cooling power caused by deposits on the housing or the fan blades. Deposits of any kind must be removed at regular intervals!

It is essential to remove layers of dust which are deposited on the gear unit housing in order to prevent accumulation of dust in the area of the gear unit. For ripped gear unit housings, special care must be taken that the spaces between the ribs are cleaned at regular intervals to prevent deposits of dust or dirt.
5.2.15 Changing the oil

The position of the oil drain screw (optionally the drain tap), vents and devices for checking the oil level can be obtained from the specific dimension sheet for the order.

![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

**Procedure:**

1. Select a collection vessel according to the stated quantity of oil 7.3.3 "Lubricant quantities" and place it under the oil drain screw or the oil drain tap (optional).
2. Unscrew the vent from the gear unit.
3. Unscrew the oil drain screw or the sealing plug from the oil drain tap and open it.
4. Completely drain the oil from the gear unit.
5. Clean the interior of the gear unit by flushing with oil so that oil sludge particles, due to wear and old residues, are removed. The same type of oil as is used for operation must be used for this.
6. Clean the thread of the oil drain screw or the sealing cap of the oil drain tap and coat with securing adhesive (e.g. Loctite 242 or Loxeal 54-03) before screwing in again. In both cases, tighten the screws with the correct torque (7.4 "Torque values").
7. Fill the gear unit with the specified quantity of fresh oil according to the type plate through the vent hole. If the gear unit is equipped with a dipstick, the oil may be filled through this hole.
8. After approx. 15 minutes (for oil level tanks 30 minutes) check the oil level as described in Section 5.2.7 "Oil level" and correct as necessary.
9. Other attached components, e.g. filters and piping should also be drained if necessary.
10. For gear units with oil circulation lubrication and oil supply systems, the oil bearing system must be drained according to the manufacturer's specifications (maintenance instructions).
5.2.16 Internal cooling system (Option: CC)

**DANGER**

Explosion hazard

Failure to comply is likely to cause severe or even fatal injuries.

- Overheating of the gear unit due to reduced cooling power because of deposits (fouling).
- The internal water cooling (cooling coil) must be cleaned or replaced if deposits are found.

To check the cooling coil, the coolant feed must be shut off and the pipes disconnected from the cooling coil. If deposits are apparent on the inner wall of the cooling coil, the deposits and the coolant must be analysed.

If a chemical cleaner is used, it must be ensured that the cleaning agent does not attack the material of the cooling coil (copper pipe and yellow brass fittings).

Please contact the NORD Service department.

5.2.17 Bearings in the gear unit

As standard, all bearings in the gear units are lubricated with an oil bath. For installation positions where this is not possible, or in case of reduced oil levels, lubricant circulation is used.

Exceptions to this are gear units SK 5..07 bis SK 6..07 in installation position M5/M6. In this installation position, the upper bearings are lubricated with grease.

Please contact the NORD Service department for replacement of the grease in the roller bearings.

Recommended grease: Petamo GHY 133N - Klüber Lubrication (7.3.1 "Roller bearing greases").
5.2.18 Gear unit monitoring (only for 2G / 2D)

**DANGER**

Explosion hazard

Failure to comply is likely to cause severe or even fatal injuries.

- The separate manufacturer's documentation must be complied with.

5.2.18.1 Resistance thermometer

A check of the effectiveness of the temperature monitoring is necessary for the function test. The limiting value which is set must be reduced to a value which is achieved in normal operation and the triggering behaviour observed. The function test must be documented. After this, the old limit value must be set again.

5.2.18.2 Pressure monitor

A check of the effectiveness of the pressure monitoring is necessary for the function test. The limiting value which is set must be increased to a value which is achieved in normal operation and the triggering behaviour observed. The function test must be documented. After this, the old limit value must be set again.
5.2.19 General overhaul

**DANGER**  
**Explosion hazard**

Failure to comply is likely to cause severe or even fatal injuries.

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

For this, the gear unit must be fully disassembled and the following work must be carried out:

1. Clean all components of the gear unit
2. Examine all gear unit components for damage
3. All damaged components must be replaced
4. Replace all roller bearings
5. Replace all seals, shaft sealing rings and Nilos rings
6. Optional: Replace the backstop
7. Optional: Replace the elastomers in the coupling

### 5.2.19.1 Approved operating duration of operation (only for 2G / 2D)

**DANGER**  
**Explosion hazard**

Failure to comply is likely to cause severe or even fatal injuries.

- The maximum permissible duration of operation after commissioning is 10 years. This also applies to higher calculated values.

With Category 2G and 2D gear units, a general overhaul is necessary after a specified period of operation. The approved period of operation is usually stated on the type plate in field MI.
Alternatively, the maintenance class CM may be stated in field MI (e.g.: MI CM = 5.).

In this case, the time for general overhaul in years after commissioning (NA) is calculated as follows:

\[ N_A = C_M \cdot f_L \cdot k_A \]

- \( C_M \): Maintenance class according to field MI of the type plate
- \( f_L \): Running time factor
  - \( f_L = 10 \): Maximum running time 2 hours per day
  - \( f_L = 6 \): Running time 2 to 4 hours per day
  - \( f_L = 3 \): Running time 4 to 8 hours per day
  - \( f_L = 1.5 \): Running time 8 to 16 hours per day
  - \( f_L = 1 \): Running time 16 to 24 hours per day
- \( k_A \): Utilisation factor (usually \( k_A = 1 \))

Longer maintenance intervals often result if the actual power required by the application is known. The utilisation factor may be calculated as follows:

\[ k_A = \left( \frac{P_1}{P_{tat}} \right)^3 \]

- \( P_1 \): max. permissible drive power or motor power in kW according to the type plate
- \( P_{tat} \): Actual drive power or motor power in kW which is required by the application at the rated speed., determined e.g. by measurements

For variable loads with differing actual drive powers with nominal speeds \( P_{tat1}, P_{tat2}, P_{tat3}, \ldots \), with known percentage times \( q_1, q_2, q_3, \ldots \), the following equivalent average drive power applies:

\[ P_{tat} = \sqrt[3]{P_{tat1}^3 \cdot \frac{q_1}{100} + P_{tat2}^3 \cdot \frac{q_2}{100} + P_{tat3}^3 \cdot \frac{q_3}{100} + \ldots} \]
6 Disposal

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

<table>
<thead>
<tr>
<th>Gear unit components</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gear wheels, shafts, rolling bearings, parallel keys, locking rings, …</td>
<td>Steel</td>
</tr>
<tr>
<td>Gear unit housing, housing components, …</td>
<td>Grey cast iron</td>
</tr>
<tr>
<td>Light alloy gear unit housing, light alloy gear unit housing components, …</td>
<td>Aluminium</td>
</tr>
<tr>
<td>Worm gears, bushes, …</td>
<td>Bronze</td>
</tr>
<tr>
<td>Shaft sealing rings, sealing caps, rubber components, …</td>
<td>Elastomers with steel</td>
</tr>
<tr>
<td>Coupling components</td>
<td>Plastic and steel</td>
</tr>
<tr>
<td>Flat seals</td>
<td>Asbestos-free sealing material</td>
</tr>
<tr>
<td>Gear oil</td>
<td>Additive mineral oil</td>
</tr>
<tr>
<td>Synthetic gear oil (adhesive label: CLP PG)</td>
<td>Polyglycol-based lubricants</td>
</tr>
<tr>
<td>Synthetic gear oil (adhesive label CLP PG)</td>
<td>Poly-alpha-olefin based lubricants</td>
</tr>
<tr>
<td>Cooling spiral, embedding material of the cooling spiral, screw fittings</td>
<td>Copper, epoxy, yellow brass</td>
</tr>
</tbody>
</table>

Table 11: Disposal of materials
7 Appendix

7.1 Standard positions of the oil drain, vent and oil level

**DANGER**  
Explosion hazard

Failure to comply is likely to cause severe or even fatal injuries.

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

<table>
<thead>
<tr>
<th>Option</th>
<th>Installation orientation</th>
<th>5x07, 6x07</th>
<th>7x07-10x07</th>
<th>11x07-15x07</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil sight glass</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M1</td>
<td>6 (D)</td>
<td>16</td>
<td>5/6 (D)</td>
<td>16</td>
</tr>
<tr>
<td>M2</td>
<td>7/13</td>
<td>7/13</td>
<td>7/13</td>
<td>7/13</td>
</tr>
<tr>
<td>M3</td>
<td>5 (D)</td>
<td>16</td>
<td>5/6 (D)</td>
<td>16</td>
</tr>
<tr>
<td>M4</td>
<td>4/12</td>
<td>---</td>
<td>4/12</td>
<td>---</td>
</tr>
<tr>
<td>M5</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>M6</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Oil gauge</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M1</td>
<td>/OT</td>
<td>/OT</td>
<td>/OT</td>
<td>/OT</td>
</tr>
<tr>
<td>M2</td>
<td>/OT</td>
<td>/OT</td>
<td>/OT</td>
<td>/OT</td>
</tr>
<tr>
<td>M3</td>
<td>/OT</td>
<td>/OT</td>
<td>/OT</td>
<td>/OT</td>
</tr>
<tr>
<td>M4</td>
<td>/OT</td>
<td>/OT</td>
<td>/OT</td>
<td>/OT</td>
</tr>
<tr>
<td>M5</td>
<td>/OT</td>
<td>/OT</td>
<td>/OT</td>
<td>/OT</td>
</tr>
<tr>
<td>M6</td>
<td>/OT</td>
<td>/OT</td>
<td>/OT</td>
<td>/OT</td>
</tr>
<tr>
<td>Dipstick</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M1</td>
<td>1/2</td>
<td>/OT</td>
<td>1/2</td>
<td>/OT</td>
</tr>
<tr>
<td>M2</td>
<td>15/17</td>
<td>/OT</td>
<td>15/17</td>
<td>/OT</td>
</tr>
<tr>
<td>M3</td>
<td>9/10</td>
<td>/OT</td>
<td>9/10</td>
<td>/OT</td>
</tr>
<tr>
<td>M4</td>
<td>5/6</td>
<td>/OT</td>
<td>5/6</td>
<td>/OT</td>
</tr>
<tr>
<td>M5</td>
<td>13/14</td>
<td>/OT</td>
<td>13/14</td>
<td>/OT</td>
</tr>
<tr>
<td>M6</td>
<td>7/8</td>
<td>/OT</td>
<td>7/8</td>
<td>/OT</td>
</tr>
<tr>
<td>Drain cock</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M1</td>
<td>7/13 (D)</td>
<td>7/13 (D)</td>
<td>7/13 (D)</td>
<td>7/13 (D)</td>
</tr>
<tr>
<td>M2</td>
<td>5/6</td>
<td>---</td>
<td>5/6</td>
<td>---</td>
</tr>
<tr>
<td>M3</td>
<td>8/14 (D)</td>
<td>8/14 (D)</td>
<td>8/14 (D)</td>
<td>8/14 (D)</td>
</tr>
<tr>
<td>M4</td>
<td>15/17</td>
<td>15/17</td>
<td>15/17</td>
<td>15/17</td>
</tr>
<tr>
<td>M5</td>
<td>7/8</td>
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<tr>
<td>M6</td>
<td>13/14</td>
<td>13/14</td>
<td>13/14</td>
<td>13/14</td>
</tr>
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</table>
### Table 12: Position of housing options on oil screw holes (standard installation positions)

<table>
<thead>
<tr>
<th>Option</th>
<th>Installation orientation</th>
<th>5x07, 6x07</th>
<th>7x07-10x07</th>
<th>11x07-15x07</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vent</td>
<td>M1</td>
<td>1/2 /OT</td>
<td>1/2 /OT</td>
<td>1/2 /OT</td>
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<tr>
<td></td>
<td>M2</td>
<td>16 /OT</td>
<td>16 /OT</td>
<td>16 /OT</td>
</tr>
<tr>
<td></td>
<td>M3</td>
<td>9/10 /OT</td>
<td>9/10 /OT</td>
<td>9/10 /OT</td>
</tr>
<tr>
<td></td>
<td>M4</td>
<td>5/6 /OT</td>
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<td>5/6 /OT</td>
</tr>
<tr>
<td></td>
<td>M5</td>
<td>13/14 /OT</td>
<td>13/14 /OT</td>
<td>13/14 /OT</td>
</tr>
<tr>
<td></td>
<td>M6</td>
<td>7/8 /OT</td>
<td>7/8 /OT</td>
<td>7/8 /OT</td>
</tr>
</tbody>
</table>

**Key:**
- **Housing:** Standard position in housing
- **Lid:** Standard position in lid
- **Oil tank:** Standard only possible in oil tank
- **OT:** Special, not possible in standard
- **(D):** If option OT, then always in the oil tank
- **(G):** Optionally in the housing
### Gear units SK 5207 – SK 10507

#### M1 oil screw holes

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
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<tr>
<td>2</td>
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<td></td>
</tr>
<tr>
<td>16</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td></td>
</tr>
</tbody>
</table>

![Diagram of gear unit SK 5207 - SK 10507 showing M1 oil screw holes](image)
Gear units SK 5207 – SK 10507

M2 oil screw holes
Gear units SK 5207 – SK 10507

M3 oil screw holes
Gear units SK 5207 – SK 10507

M4 / oil screw holes
<table>
<thead>
<tr>
<th>Gear units SK 5207 – SK 10507</th>
</tr>
</thead>
<tbody>
<tr>
<td>M5 oil screw holes</td>
</tr>
</tbody>
</table>

![Diagram of Gear units SK 5207 – SK 10507](image-url)
Gear units SK 5207 – SK 10507

M6 oil screw holes

Figure 31: Numbering of oil screw holes on SK 5207 – SK 10507
## Gear units SK 11207 – SK 15507

<table>
<thead>
<tr>
<th>M1 oil screw holes</th>
</tr>
</thead>
</table>

### Diagram:

- **Top View:**
  - Components labeled 1 to 20
  - Notation: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

- **Side View:**
  - Components labeled 5, 6, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20
Gear units SK 11207 – SK 15507

M2 oil screw holes
### Gear units SK 11207 – SK 15507

<table>
<thead>
<tr>
<th>M3 oil screw holes</th>
</tr>
</thead>
</table>

- **Diagram 1:**
  - Numbered parts from 1 to 20.

- **Diagram 2:**
  - Numbered parts from 1 to 4.
## Gear units SK 11207 – SK 15507

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M4 oil screw holes</td>
</tr>
</tbody>
</table>

---

**Diagram:**

1. M4 oil screw holes

---

**Diagram:**

1. M4 oil screw holes
## Gear units SK 11207 – SK 15507

M5 oil screw holes
## Gear units SK 11207 – SK 15507

| Figure 32: Numbering of oil screw holes on SK 11207 – SK 15507 |

M6 oil screw holes
7.2 Installation orientation

7.2.1 Helical gear unit

Figure 33: Helical gear unit installation positions with standard mounting surface

7.2.2 Bevel helical gear unit

Figure 34: Bevel gear unit installation positions with standard mounting surface
## 7.3 Lubricants

### 7.3.1 Roller bearing greases

This table shows comparable roller bearing greases from various manufacturers

<table>
<thead>
<tr>
<th>Roller bearing greases</th>
<th>Ambient temperature °C</th>
<th>bp</th>
<th>Castrol</th>
<th>Fuchs</th>
<th>KLOBER</th>
<th>Mobil</th>
<th>Gadus S2 V100 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mineral oil based</strong></td>
<td>From</td>
<td>to</td>
<td>Energrease LS 2</td>
<td>Longtime PD 2</td>
<td>RENOLIT GP 2</td>
<td>RENOLIT LZR 2 H</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>-30</td>
<td>60</td>
<td>Energrease LS-EP 2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>-50</td>
<td>40</td>
<td>-</td>
<td>Optitemp LG 2</td>
<td>RENOLIT JP 1619</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Synthetic</strong></td>
<td>-25</td>
<td>80</td>
<td>Energrease SY 2202</td>
<td>Tribol 4747</td>
<td>RENOLIT HLT 2</td>
<td>-</td>
<td>Mobiltemp SHC 32</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>RENOLIT LST 2</td>
<td>PETAMO GHY 133 N</td>
<td>Klüberplex BEM 41-132</td>
<td>-</td>
</tr>
<tr>
<td><strong>Food compatible</strong></td>
<td>-25</td>
<td>40</td>
<td>-</td>
<td>Obeen UF 2</td>
<td>RENOLIT G 7 FG 1</td>
<td>Klübersynth UH1 14-151</td>
<td>Mobilgrease FM 222</td>
</tr>
</tbody>
</table>

Table 13: Roller bearing greases

The manufacturer can be changed for a given grease type. NORD must be consulted if the type of grease or the range of ambient temperatures is changed. Otherwise no guarantee can be accepted for the function of the gear unit.
7.3.2 Types of lubricant oil

**DANGER**

Explosion hazard

Failure to comply is likely to cause severe or even fatal injuries.

- When changing oil or filling for the first time, the type of lubricant stated on the type plate must be used.

**NOTICE!**

Gear unit damage

Failure to comply with this will result in damage to the gear unit.

- When changing oil or filling for the first time, the type of lubricant stated on the type plate must be used.
- The minimum permissible oil bath temperatures depend on the type of lubrication which is used. These temperatures are stated in catalogue G1050.
- Additives and/or solid lubricants (corrosion inhibitors) may not be added to the stated lubricant without testing or approval by Getriebebau NORD.
- Mixing of gear oil and roller bearing grease must not occur.
- Do not expose the gear unit to harmful influences such as aggressive chemical products.

The following table assigns the type of gear oil stated on the type plate (3.5 "Checking the type plate data") to the particular approved product and the manufacturer.

If different oil types are mixed, damage to the gear unit is possible due to inadequate lubrication through oil incompatibility.

Fill the gear unit with the previously used oil type. Mixing of oils of various types or from different manufacturers is not permissible. In particular, polyglycol oils must not be mixed with mineral oils or other synthetic oils. If the oil type is changed, thoroughly flush the gear unit with the new oil type before filling. Use the new oil type for this.

Getriebebau NORD must be consulted in case of change of viscosity or lubricant type, as otherwise no warranty for the functionality of our gearboxes can otherwise be accepted.
## Explosion-protected industrial gear units – Operating and Assembly Instructions

<table>
<thead>
<tr>
<th>Lubricant oil</th>
<th>Viscosity [mm²/s]</th>
<th>Ambient temperature [°C]</th>
<th>bp</th>
<th>Castrol</th>
<th>FUCHS</th>
<th>Klüberoil</th>
<th>Mobil</th>
<th>Shell Omala</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>From</td>
<td>to</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CLP</strong> (Mineral)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>220</td>
<td></td>
<td>-10</td>
<td>Alpha SP</td>
<td></td>
<td></td>
<td>Renolin CLP</td>
<td>Mobilgear 600 XP</td>
<td></td>
</tr>
<tr>
<td>320</td>
<td></td>
<td>40</td>
<td>Alpha MAX</td>
<td></td>
<td></td>
<td>Renolin CLP Plus</td>
<td>Mobilgear XMP</td>
<td></td>
</tr>
<tr>
<td>680</td>
<td>0</td>
<td>40</td>
<td>Optigear BM</td>
<td></td>
<td></td>
<td>Gearmaster CLP</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tribol 1100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CLP PG</strong> (Synthetic - Polyglycol)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>220</td>
<td></td>
<td>-25</td>
<td>Enersyn SG-XP</td>
<td></td>
<td></td>
<td>Renolin PG</td>
<td>Shell Omala S4 WE</td>
<td></td>
</tr>
<tr>
<td>320</td>
<td></td>
<td>40</td>
<td>Tribol 1300</td>
<td></td>
<td></td>
<td>Gearmaster PGP</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>680</td>
<td>-20</td>
<td>40</td>
<td>Optigear Synth X</td>
<td></td>
<td></td>
<td>KLüberversyn GH 6</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>CLP HC</strong> (Synthetic hydrocarbon)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>220</td>
<td></td>
<td>-40</td>
<td>Enersyn EP-XF</td>
<td></td>
<td></td>
<td>Renolin Unisyn CLP</td>
<td>Shell Omala S4 GX</td>
<td></td>
</tr>
<tr>
<td>320</td>
<td></td>
<td>-25</td>
<td>Tribol 1710</td>
<td></td>
<td></td>
<td>Gearmaster SYN</td>
<td>Mobil SHC 632</td>
<td></td>
</tr>
<tr>
<td>680</td>
<td>-10</td>
<td>40</td>
<td>Optigear Synth X</td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>CLP E</strong> (Bio-degradable)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>220</td>
<td></td>
<td>-5</td>
<td>Tribol BioTop 1418</td>
<td></td>
<td></td>
<td>Plantogear S</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>320</td>
<td></td>
<td>40</td>
<td>-</td>
<td></td>
<td></td>
<td>Gearmaster ECO</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>680</td>
<td></td>
<td></td>
<td>-</td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>CLP PG H1</strong> (food compatible)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>220</td>
<td></td>
<td>-25</td>
<td>-</td>
<td></td>
<td></td>
<td>Cassida Fluid WG</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>320</td>
<td></td>
<td>-20</td>
<td>-</td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>680</td>
<td></td>
<td>-5</td>
<td>-</td>
<td></td>
<td></td>
<td>Optileb GT</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

Table 14: Lubricant oil table
7.3.3 Lubricant quantities

DANGER

Explosion hazard

Failure to comply is likely to cause severe or even fatal injuries.

- When filling, always use the oil level screw as an indicator of the precise quantity of oil. After filling, the oil level must be checked as described in Section 5.2.7 “Oil level”.

Information

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 hollow spaces only fill gradually during operation.

- We recommend that the oil level is checked and corrected as necessary after an operating time of 2 hours.

7.3.3.1 Helical gear units

The filling quantities stated in the following tables are for guidance only. The precise values vary depending on the precise speed ratio and must be obtained from the type plate.

<table>
<thead>
<tr>
<th>[L]</th>
<th>M1</th>
<th>M2</th>
<th>M3</th>
<th>M4</th>
<th>M5</th>
<th>M6</th>
<th>OT</th>
</tr>
</thead>
<tbody>
<tr>
<td>SK 5207 / 5307</td>
<td>21</td>
<td>31</td>
<td>26</td>
<td>39</td>
<td>37</td>
<td>37</td>
<td>54(2)</td>
</tr>
<tr>
<td>SK 6207 / 6307</td>
<td>26</td>
<td>37</td>
<td>32</td>
<td>45</td>
<td>42</td>
<td>42</td>
<td>63(3)</td>
</tr>
<tr>
<td>SK 7207 / 7307</td>
<td>36</td>
<td>45</td>
<td>36</td>
<td>58</td>
<td>46</td>
<td>46</td>
<td>98(3)</td>
</tr>
<tr>
<td>SK 8207 / 8307</td>
<td>44</td>
<td>55</td>
<td>48</td>
<td>75</td>
<td>57</td>
<td>57</td>
<td>106(3)</td>
</tr>
<tr>
<td>SK 9207 / 9307</td>
<td>57</td>
<td>71</td>
<td>73</td>
<td>76</td>
<td>74</td>
<td>74</td>
<td>150(3)</td>
</tr>
<tr>
<td>SK 10207 / 10307</td>
<td>72</td>
<td>89</td>
<td>90</td>
<td>96</td>
<td>92</td>
<td>92</td>
<td>180(3)</td>
</tr>
<tr>
<td>SK 11207 /11307</td>
<td>105</td>
<td>130</td>
<td>105</td>
<td>140</td>
<td>105</td>
<td>140</td>
<td>193(3)</td>
</tr>
<tr>
<td>SK 12207 / 12307</td>
<td>116</td>
<td>185</td>
<td>149</td>
<td>203</td>
<td>199(1)</td>
<td>69(1)</td>
<td>69(1)</td>
</tr>
<tr>
<td>SK 13207 /13307</td>
<td>154</td>
<td>256</td>
<td>201</td>
<td>290</td>
<td>199(1)</td>
<td>73(1)</td>
<td>73(1)</td>
</tr>
<tr>
<td>SK 14207 /14307</td>
<td>225</td>
<td>374</td>
<td>291</td>
<td>424</td>
<td>392(1)</td>
<td>139(1)</td>
<td>139(1)</td>
</tr>
<tr>
<td>SK 15207 /15307</td>
<td>358</td>
<td>415</td>
<td>314</td>
<td>450</td>
<td>405(1)</td>
<td>170(1)</td>
<td>170(1)</td>
</tr>
</tbody>
</table>

Table 15: Lubricant quantities for helical gear units
7.3.3.2 Helical bevel gear units

The filling quantities stated in the following tables are for guidance only. The precise quantities vary depending on the exact gear ratio. For correction value see WN 3-020-12.

![Image]

<table>
<thead>
<tr>
<th>[L]</th>
<th>M1</th>
<th>M2</th>
<th>M3</th>
<th>M4</th>
<th>M5</th>
<th>M6</th>
<th>OT</th>
</tr>
</thead>
<tbody>
<tr>
<td>SK 5407 / 5507</td>
<td>24</td>
<td>34</td>
<td>26</td>
<td>42</td>
<td>40</td>
<td>40</td>
<td>53</td>
</tr>
<tr>
<td>SK 6407 / 6507</td>
<td>29</td>
<td>40</td>
<td>32</td>
<td>48</td>
<td>44</td>
<td>44</td>
<td>66</td>
</tr>
<tr>
<td>SK 7407 / 7507</td>
<td>40</td>
<td>47</td>
<td>38</td>
<td>50</td>
<td>49</td>
<td>50</td>
<td>90</td>
</tr>
<tr>
<td>SK 8407 / 8507</td>
<td>42</td>
<td>58</td>
<td>47</td>
<td>62</td>
<td>60</td>
<td>62</td>
<td>106</td>
</tr>
<tr>
<td>SK 9407 / 9507</td>
<td>70</td>
<td>83</td>
<td>61</td>
<td>80</td>
<td>78</td>
<td>80</td>
<td>141</td>
</tr>
<tr>
<td>SK 10407 / 10507</td>
<td>88</td>
<td>103</td>
<td>77</td>
<td>101</td>
<td>97</td>
<td>101</td>
<td>161</td>
</tr>
<tr>
<td>SK 11407 /11507</td>
<td>117</td>
<td>137</td>
<td>57(1)</td>
<td>102</td>
<td>147(2)</td>
<td>40(2)</td>
<td>142(2)</td>
</tr>
<tr>
<td>SK 12407 / 12507</td>
<td>159</td>
<td>196</td>
<td>93(2)</td>
<td>149</td>
<td>213(2)</td>
<td>65(2)</td>
<td>209(2)</td>
</tr>
<tr>
<td>SK 13407 /13507</td>
<td>159</td>
<td>270</td>
<td>121(2)</td>
<td>198</td>
<td>304(2)</td>
<td>73(2)</td>
<td>282(2)</td>
</tr>
<tr>
<td>SK 14407 /14507</td>
<td>230</td>
<td>395</td>
<td>177(2)</td>
<td>281</td>
<td>444(2)</td>
<td>107(2)</td>
<td>412(2)</td>
</tr>
<tr>
<td>SK 15407 /15507</td>
<td>241</td>
<td>439</td>
<td>188(2)</td>
<td>320</td>
<td>474(2)</td>
<td>125(2)</td>
<td>429(2)</td>
</tr>
</tbody>
</table>

Table 16: Lubricant quantities for bevel helical gear units

7.3.3.3 MAXXDRIVE® XT industrial helical bevel gear unit

![Image]

<table>
<thead>
<tr>
<th>[L]</th>
<th>M1/M3</th>
</tr>
</thead>
<tbody>
<tr>
<td>SK 5217</td>
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</tr>
<tr>
<td>SK 6217</td>
<td>31</td>
</tr>
<tr>
<td>SK 7217</td>
<td>43</td>
</tr>
<tr>
<td>SK 8217</td>
<td>53</td>
</tr>
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<td>SK 9217</td>
<td>68</td>
</tr>
<tr>
<td>SK 10217</td>
<td>100</td>
</tr>
<tr>
<td>SK 11217</td>
<td>126</td>
</tr>
</tbody>
</table>

Table 17: Lubricant quantities MAXXDRIVE® XT bevel gear unit
7.4 Torque values

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Screw connections in the strength classes</th>
<th>Cover screws</th>
<th>Threaded pin on coupling</th>
<th>Screw connections on protective covers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8.8</td>
<td>10.9</td>
<td>12.9</td>
<td></td>
</tr>
<tr>
<td>M4</td>
<td>3.2</td>
<td>5</td>
<td>6</td>
<td>-</td>
</tr>
<tr>
<td>M5</td>
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<td>M8</td>
<td>27</td>
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<td>M10</td>
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<td>91</td>
<td>11</td>
</tr>
<tr>
<td>M12</td>
<td>92</td>
<td>135</td>
<td>155</td>
<td>27</td>
</tr>
<tr>
<td>M16</td>
<td>230</td>
<td>335</td>
<td>390</td>
<td>35</td>
</tr>
<tr>
<td>M20</td>
<td>460</td>
<td>660</td>
<td>770</td>
<td>-</td>
</tr>
<tr>
<td>M24</td>
<td>790</td>
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<td>1300</td>
<td>80</td>
</tr>
<tr>
<td>M30</td>
<td>1600</td>
<td>2250</td>
<td>2650</td>
<td>170</td>
</tr>
<tr>
<td>M36</td>
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</tr>
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<td>M48</td>
<td>6140</td>
<td>8640</td>
<td>16610</td>
<td>-</td>
</tr>
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<td>M56</td>
<td>9840</td>
<td>13850</td>
<td>24130</td>
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</tr>
<tr>
<td>G½</td>
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<td>-</td>
<td>75</td>
</tr>
<tr>
<td>G¾</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>110</td>
</tr>
<tr>
<td>G1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>190</td>
</tr>
<tr>
<td>G1½</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>240</td>
</tr>
<tr>
<td>G1¾</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>300</td>
</tr>
</tbody>
</table>

Table 18: Torque values

7.5 Tolerances for bolting surfaces

| Permissible tolerances for straightness and flatness of bolting surfaces [mm] |
|---------------------|---------------------|---------------------|---------------------|---------------------|
| up to 10             | above 10 up to 30   | above 30 up to 100  | above 100 up to 300 | above 300 up to 1000|
| 0.05                 | 0.10                | 0.20                | 0.40                | 0.60                |

Table 19: Tolerances for flatness of bolting surfaces
7.6 Troubleshooting

⚠️ **DANGER**  Explosion hazard

Failure to comply is likely to cause severe or even fatal injuries.

- Shut down the gear unit immediately should any faults occur.

---

⚠️ **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.
<table>
<thead>
<tr>
<th>Fault</th>
<th>Possible cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unusual running noises, Vibrations</td>
<td>Oil level too low</td>
<td>Correct oil level</td>
</tr>
<tr>
<td></td>
<td>Bearing damage</td>
<td>Consult NORD Service</td>
</tr>
<tr>
<td></td>
<td>Gear wheel damage</td>
<td>Consult NORD Service</td>
</tr>
<tr>
<td>Oil leaks from the geared motor</td>
<td>Defective seal</td>
<td>Consult NORD Service</td>
</tr>
<tr>
<td>Oil escaping from pressure vent</td>
<td>Oil level too high</td>
<td>Correct oil level</td>
</tr>
<tr>
<td></td>
<td>Unfavourable operating conditions</td>
<td>Consult NORD Service</td>
</tr>
<tr>
<td>Gear unit becomes too hot</td>
<td>Incorrect oil in the gear unit</td>
<td>Check oil</td>
</tr>
<tr>
<td></td>
<td>Incorrect oil level</td>
<td>Correct oil level</td>
</tr>
<tr>
<td></td>
<td>Dirty oil</td>
<td>Replace oil and filter</td>
</tr>
<tr>
<td></td>
<td>Cooling system dirty</td>
<td>Clean cooling system</td>
</tr>
<tr>
<td></td>
<td>Gear unit dirty</td>
<td>Clean gear unit</td>
</tr>
<tr>
<td></td>
<td>Cooling defective</td>
<td>Consult NORD Service</td>
</tr>
<tr>
<td></td>
<td>Gear unit overloaded</td>
<td>Consult NORD Service</td>
</tr>
<tr>
<td></td>
<td>Impermissible axial or radial forces</td>
<td>Consult NORD Service</td>
</tr>
<tr>
<td></td>
<td>Unfavourable installation situation</td>
<td>Consult NORD Service</td>
</tr>
<tr>
<td></td>
<td>Gear unit damage</td>
<td>Consult NORD Service</td>
</tr>
<tr>
<td>Shock when switching on</td>
<td>Motor coupling defective</td>
<td>Replace coupling</td>
</tr>
<tr>
<td></td>
<td>Motor coupling worn</td>
<td>Replace elastomer ring</td>
</tr>
<tr>
<td></td>
<td>Gear unit fastening loose</td>
<td>Check gear unit and motor fastening</td>
</tr>
<tr>
<td></td>
<td>Rubber element worn</td>
<td>Replace rubber element</td>
</tr>
<tr>
<td>Output shaft does not rotate although motor is running</td>
<td>Motor coupling defective</td>
<td>Replace coupling</td>
</tr>
<tr>
<td></td>
<td>Shrink disc slip</td>
<td>Check shrink disc</td>
</tr>
<tr>
<td></td>
<td>Breakage in gear unit</td>
<td>Consult NORD Service</td>
</tr>
<tr>
<td>Cooling system failure</td>
<td>Cooling system defective</td>
<td>Observe the separate operating manual</td>
</tr>
<tr>
<td>Pressure at the pressure safeguard is too low</td>
<td>Pump does not deliver oil</td>
<td>Check pump and replace as necessary</td>
</tr>
<tr>
<td></td>
<td>Leakage</td>
<td>Check piping and replace as necessary</td>
</tr>
</tbody>
</table>

Table 20: Overview of malfunctions
7.7 Leakage and leak-tightness

Gear units are filled with oil or grease to lubricate the moving parts. Seals prevent the escape of lubricants. A complete seal is technically not 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 (Option: Taconite) grease emerges from the sealing gap. This apparent leak is not a fault.

According to the test conditions according to DIN 3761, the leak is due to the sealing medium.

<table>
<thead>
<tr>
<th>Term</th>
<th>Explanation</th>
<th>Shaft sealing ring</th>
<th>In IEC adapter</th>
<th>Housing joint</th>
<th>Venting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sealed</td>
<td>No moisture apparent</td>
<td>No fault</td>
<td>No fault</td>
<td>No fault</td>
<td>No fault</td>
</tr>
<tr>
<td>Damp</td>
<td>Moisture film locally restricted (not an area)</td>
<td>No fault</td>
<td>No fault</td>
<td>No fault</td>
<td>No fault</td>
</tr>
<tr>
<td>Wet</td>
<td>Moisture film beyond the extent of the component</td>
<td>No fault</td>
<td>No fault</td>
<td>Repair if necessary</td>
<td>No fault</td>
</tr>
</tbody>
</table>

Definition of leakage according to DIN 3761 and its appropriate use
### Definition of leakage according to DIN 3761 and its appropriate use

<table>
<thead>
<tr>
<th>Term</th>
<th>Explanation</th>
<th>Location of leak</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Shaft sealing ring</td>
</tr>
<tr>
<td>Measurable leakage</td>
<td>Recognisable stream, dripping</td>
<td>Repair recommended</td>
</tr>
<tr>
<td>Temporary leakage</td>
<td>Temporary malfunction of the sealing system or oil leak due to transport *)</td>
<td>No fault</td>
</tr>
<tr>
<td>Apparent leakage</td>
<td>Apparent leakage, e.g. due to soiling, sealing systems which can be re-lubricated</td>
<td>No fault</td>
</tr>
</tbody>
</table>

*) 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.

Table 21: Definition of leakage according to DIN 3761
7.8 Declaration of Conformity

7.8.1 Explosion protected gear units and geared motors, Category 2G and 2D

Declaration of Conformity for Category 2G / 2D, valid for labelling on the type plate according to DIN EN 13463-1.

Figure 35: Declaration of Conformity for Category 2G / 2D, labelling according to EN ISO 13463-1
Declaration of Conformity for Category 2G / 2D, valid for labelling on the type plate according to DIN EN ISO 80079-36

Getriebebau NORD GmbH & Co. KG
Getriebebau-Nord-Str. 1, 22341 Bargteheide, Germany. Tel: +49(0)4532 289 - 0, Fax: +49(0)4532 289 - 2253, info@nord.com

EU Declaration of Conformity

According to EU directive 2014/34/EU Annex VIII

Getriebebau NORD GmbH & Co. KG hereby declares, that the gear units from the following product series

Industrial gear units
SK 5...07, SK 6...07, SK 7...07, SK 8...07, SK 9...07, SK 10...07,
SK 11...07, SK 12...07, SK 13...07, SK 14...07, SK 15...07

SK 5..17, SK 6..17, SK 7..17, SK 8..17, SK 9..17, SK 10..17, SK 11..17

with ATEX labelling Ex II 2D / 2G

are compliant with the following directive:
ATEX directive for products 2014/34/EU

Applied standards:
DIN EN 1127-1: 2011
DIN EN 60079-0: 2014

Getriebebau NORD has submitted the documents required as per 2014/34/EU Annex VIII to the notified body:
DEKRA EXAM GmbH
Dinnendahlstraße 9
44809 Bochum
ID number:0158
Certificate: BVS 10 ATEX H/B 017

Bargteheide, 05.03.2019

Dr. O. Sadi
Technical Manager

Figure 36: Declaration of Conformity for Category 2G / 2D, labelling according to DIN EN ISO 80079-36
7.8.2 Explosion protected gear units and geared motors, Category 3G and 3D

Declaration of Conformity for Category 3G / 3D, valid for labelling on the type plate according to EN ISO 13463-1

Figure 37: Declaration of Conformity for Category 3G / 3D, labelling according to EN ISO 13463-1
Declaration of Conformity for Category 3G / 3D, valid for labelling on the type plate according to DIN EN ISO 80079-36

GETRIEBEBAU NORD
Member of the NORD DRIVESYSTEMS Group

Getriebebau NORD GmbH & Co. KG
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EU Declaration of Conformity
According to EU directive 2014/34/EU Annex VIII

Getriebebau NORD GmbH & Co. KG hereby declares, that the gear units from the following product series

Industrial gear units
SK 5..07, SK 6..07, SK 7..07, SK 8..07, SK 9..07, SK 10..07,
SK 11..07, SK 12..07, SK 13..07, SK 14..07, SK 15..07
SK 5..17, SK 6..17, SK 7..17, SK 8..17, SK 9..17, SK 10..17, SK 11..17

with ATEX labelling \(\text{Ex II 3D} / \text{3G}\)

are compliant with the following directive:
ATEX directive for products 2014/34/EU

Applied standards:

- DIN EN 1127-1: 2011
- DIN EN 50079-0: 2014

Bargteheide, 05.03.2019

Dr. O. Sacii
Technical Manager

Figure 38: Declaration of Conformity for Category 3G / 3D, labelling according to DIN EN ISO 80079-36
7.9  Repair information

Please keep the type plate data at hand when making enquiries to our Service department.

7.9.1  Repairs

In case of repair, the gear unit or geared motor must be delivered to the following address

Getriebebau NORD GmbH & Co. KG
Service
Getriebebau-Nord-Straße 1
22941 Bargteheide

In case of a repair by NORD, no warranty can be accepted for customer's attachments, e.g. encoders or external fans.

Please remove all parts which were not included in the original scope of delivery from the gear unit or the motor.

<table>
<thead>
<tr>
<th>Information</th>
<th>Reason for return</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before making a return, NORD Service must be contacted and the reason for the return and the expected delivery date must be stated in writing. In addition, at least one contact for queries should be stated.</td>
<td></td>
</tr>
</tbody>
</table>

This is important in order to keep repair times as short and efficient as possible.

7.9.2  Internet information

Specific national operating and maintenance instructions in the available languages can be found on our website: www.nord.com.
### 7.10 Abbreviations

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
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<tr>
<td>2G</td>
<td>Gas explosion protected gear units Zone 1</td>
</tr>
<tr>
<td>3G</td>
<td>Gas explosion protected gear units Zone 2</td>
</tr>
<tr>
<td>2D</td>
<td>Dust explosion protected gear units Zone 21</td>
</tr>
<tr>
<td>3G</td>
<td>Dust explosion protected gear units Zone 22</td>
</tr>
<tr>
<td>ATEX</td>
<td>ATmosphères EXplosibles</td>
</tr>
<tr>
<td>B5</td>
<td>Flange mounting with through holes</td>
</tr>
<tr>
<td>B14</td>
<td>Flange mounting with threaded holes</td>
</tr>
<tr>
<td>CW</td>
<td>Clockwise, right-hand direction of rotation</td>
</tr>
<tr>
<td>CCW</td>
<td>Counter-clockwise, left-hand direction of rotation</td>
</tr>
<tr>
<td>°dH</td>
<td>Water hardness in German hardness degrees</td>
</tr>
<tr>
<td>DIN</td>
<td>German standards institute</td>
</tr>
<tr>
<td>EC</td>
<td>European Community</td>
</tr>
<tr>
<td>EN</td>
<td>European standard</td>
</tr>
<tr>
<td>FR</td>
<td>Radial transverse force</td>
</tr>
<tr>
<td>FA</td>
<td>Axial force</td>
</tr>
<tr>
<td>IE1</td>
<td>Motors with standard efficiency</td>
</tr>
<tr>
<td>IE2</td>
<td>Motors with high efficiency</td>
</tr>
<tr>
<td>IEC</td>
<td>International Electrotechnical Commission</td>
</tr>
<tr>
<td>NEMA</td>
<td>National Electrical Manufacturers Association</td>
</tr>
<tr>
<td>IP55</td>
<td>International Protection</td>
</tr>
<tr>
<td>ISO</td>
<td>International Standardisation Organisation</td>
</tr>
<tr>
<td>pH</td>
<td>pH value</td>
</tr>
<tr>
<td>PPE</td>
<td>Personal Protective Equipment</td>
</tr>
<tr>
<td>RL</td>
<td>Directive</td>
</tr>
<tr>
<td>VCI</td>
<td>Volatile Corrosion Inhibitor</td>
</tr>
<tr>
<td>WN</td>
<td>Getriebebau NORD factory standard</td>
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