



**Special lubricants for wind turbines**  
Product selection

**Lubrication is our world**



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# Klüber special lubricants – always a good choice

## Quality put to the test

- Klüber has more than 110 test rigs, which include standardised equipment as well as tools Klüber has developed to regularly test the quality of its products.
- Test results prove the high quality level and provide you with a solid basis for selecting the right lubricant.
- You can obtain Klüber products of consistent quality made at our production plants worldwide.

## All-around service

- Comprehensive consulting and technical support
- Development of plant lubrication charts
- Automatic lube point monitoring by means of Klüber Maintenance Software (KMS)
- Analysis of your used lubricants and components
- Audits at your facility
- Tailor-made training for your staff

## Benefit from experience

- Close cooperation with OEMs and operators since 1929
- Series supplier to many OEMs on all continents
- OEMs in all industries recommend Klüber lubricants for their components
- Alliances with partner companies for maximum user benefit
- The product range comprises oils, greases, pastes, waxes and bonded coatings, so the right lubricant for any application can be selected.

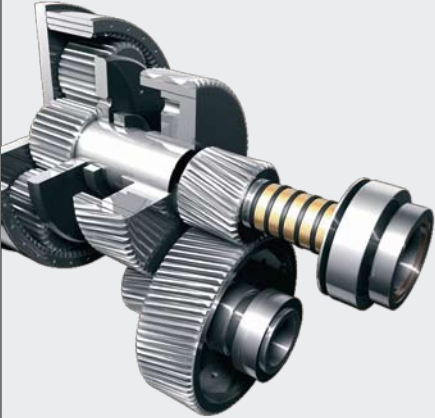

## Time is money – we help to save you both by enabling

- Optimised processes
- Higher productivity
- Compliance with legal requirements and quality standards
- Reduction of maintenance times and repair costs
- Development partnerships giving you a head-start in innovation and differentiating yourself from the competition

## Humans and the environment – what really counts

- Products that last a lifetime and enable minimum-quantity lubrication to be used help to save resources and reduce disposal quantities.
- Speciality lubricants optimised for higher efficiency reduce energy consumption and hence CO<sub>2</sub> emission.
- Clean, safe products that are easy to handle are the fundamental criteria used in the lubricant development by the Klüber experts.



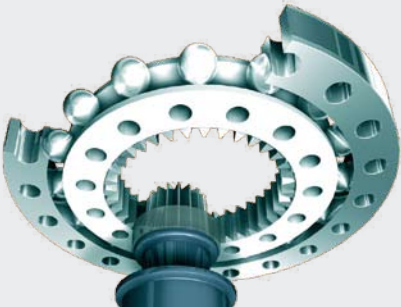

# Lubricants for enclosed gears

| Component  | Requirements   |
|--|--|
|   | <p><b>Main gearbox</b></p> <ul style="list-style-type: none"><li>• High scuffing resistance and excellent micro-pitting resistance required</li></ul>  |
|  | <p><b>Gear motors</b></p> <ul style="list-style-type: none"><li>• Compatibility with paints and elastomers required</li><li>• Gear operation depends also on reliability of the rolling bearings. Requirements of rolling bearing manufacturers must therefore also be met</li></ul> |



| Lubricant           | Comment  | Benefits   |
|---------------------|--|--|
| Klübersynth GEM 2   | <ul style="list-style-type: none"> <li>• Rapidly biodegradable synthetic high-performance gear oil for normal and elevated temperatures, normal and high loads</li> <li>• Use in eco-sensitive areas</li> <li>• Oil life approx. 3 x longer than that of mineral oil based lubricants</li> </ul> | <ul style="list-style-type: none"> <li>• High FZG scuffing resistance &gt; 13 offers protection at normal and elevated loads</li> <li>• High micro-pitting resistance protects against premature fatigue failure</li> <li>• Good wear protection prevents premature rolling bearing failure</li> <li>• Dynamic seal compatibility tests with NBR and FKM document protection against oil-induced leakage</li> <li>• No clogging of filters</li> <li>• Low residue formation keeps gears clean</li> <li>• Higher efficiency leading to optimised yield</li> </ul> |
| Klübersynth GH 6    | <ul style="list-style-type: none"> <li>• Synthetic high-performance gear oil series for high temperatures and loads</li> <li>• Oil life approx. 5 x longer than that of mineral oil based lubricants</li> </ul>  |  |
| Klübersynth GEM 4 N | <ul style="list-style-type: none"> <li>• Synthetic high-performance gear oil for particularly low and elevated temperatures and high loads</li> <li>• Oil life approx. 3 x longer than that of mineral oil based lubricants</li> </ul>   |  |

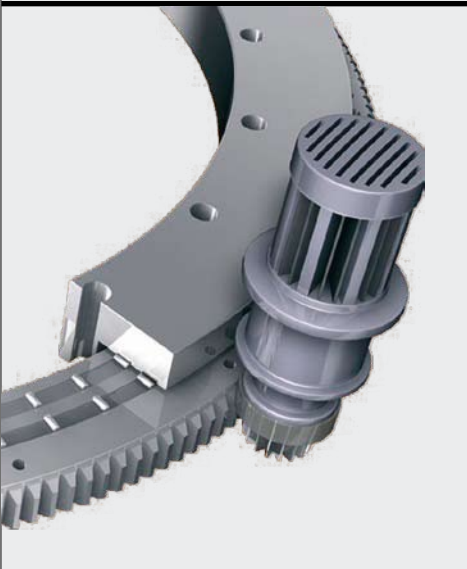
# Lubricants for bearings


| Component   |                            | Requirements   |
|---|----------------------------|--|
|    | <b>Main bearing</b>        | <ul style="list-style-type: none"> <li>• Low speeds</li> <li>• Occasional oscillating motion</li> <li>• High loads</li> <li>• Vibration</li> </ul>                               |
|  | <b>Generator bearing</b>   | <ul style="list-style-type: none"> <li>• High speeds</li> <li>• Occasional oscillating motion</li> <li>• High temperatures</li> <li>• High loads</li> <li>• Vibration</li> </ul> |
|  | <b>Blade pitch bearing</b> | <ul style="list-style-type: none"> <li>• Oscillating motion</li> <li>• Low temperatures</li> <li>• High loads</li> <li>• Vibration</li> </ul>                                    |
|   | <b>Yaw bearing</b>         | <ul style="list-style-type: none"> <li>• Oscillating motion</li> <li>• High loads</li> <li>• Vibration</li> </ul>  |



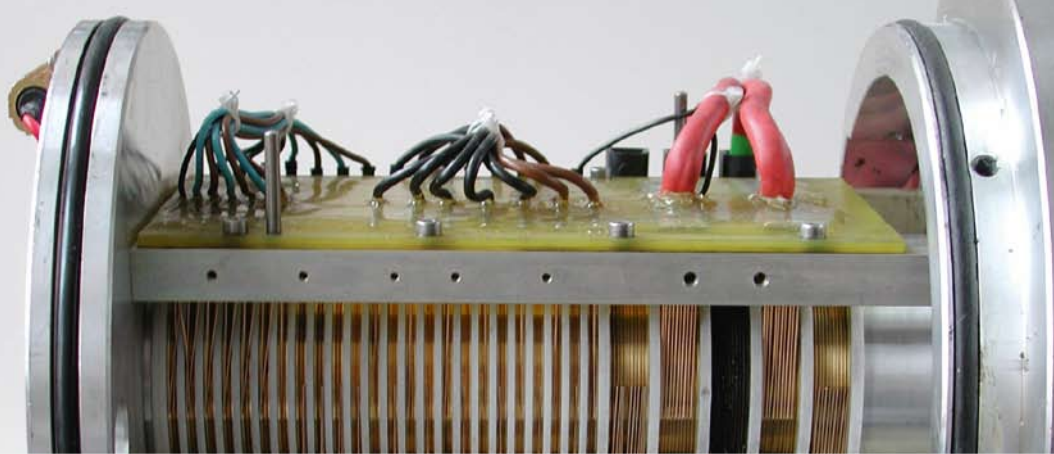
|  | Lubricant   | Comment   | Benefits  |
|--|---|---|---|
|  | Klüberplex BEM 41-141   |   |   |
|  | <p><b>For initial lubrication and relubrication:</b><br/>Klüberplex BEM 41-132</p> <p><b>For relubrication:</b><br/>Klüberplex BEM 41-141</p> | <p>The ADDED value</p> <p>The special grease Klüberplex BEM 41-141 fulfills and exceeds all the requirements of the bearing and wind turbine manufacturers as well as the aftermarket operators. The wide service temperature range, good pumpability and metering in centralised lubricating systems plus the good grease distribution and oil release ensure trouble-free operation of wind turbine bearing systems. The good wear protection properties, even under vibration conditions, lead to extended bearing life.</p> | <ul style="list-style-type: none"> <li>• Less downtimes, more production time</li> <li>• Reduction of repair and spare parts costs</li> </ul> |
|  | Klüberplex BEM 41-141   | <p>The ADDED value</p> <p>The special grease Klüberplex BEM 41-141 fulfills and exceeds all the requirements of the bearing and wind turbine manufacturers as well as the aftermarket operators. The wide service temperature range, good pumpability and metering in centralised lubricating systems plus the good grease distribution and oil release ensure trouble-free operation of wind turbine bearing systems. The good wear protection properties, even under vibration conditions, lead to extended bearing life.</p> | <ul style="list-style-type: none"> <li>• Simpler logistics due to leaner range of products and less storage</li> </ul>                        |
|  | Klüberplex BEM 41-141   |   |   |

# Lubricants for slew ring drives and slip rings

| Component   |   | Requirements  |
|---|---|---|
|  | <b>Slew ring drives<br/>(yaw and pitch control)</b> | <ul style="list-style-type: none"><li>• Low motion amplitude</li><li>• High load</li><li>• Vertical tooth flanks</li><li>• Tendency towards corrosion</li></ul> |

| Component  |                   | Requirements  |
|--|-------------------|---|
|  | <b>Slip rings</b> | <ul style="list-style-type: none"><li>• Wear and corrosion increase transition resistance</li></ul> |





| Lubricant            | Benefits   |
|----------------------|--|
| Klüberplex AG 11-462 | <ul style="list-style-type: none"> <li>• The product offers good adhesion and does not drop from the tooth flanks, even in the vertical orientation (unlike other lubricants). This reduces lubricant consumption, disposal and nacelle cleaning costs</li> <li>• Light colour prevents staining of the nacelle and tower</li> <li>• Good pumpability and metering in centralised lubricating systems, hence trouble-free turbine operation and availability</li> <li>• Anti-corrosive effect provided during non-operation as well as in offshore applications where the nacelle is exposed to salty, humid air</li> <li>• Klüberplex AG 11-462 can be used for large and small open gears</li> </ul> |

| Lubricant          | Benefits  |
|--------------------|---|
| Klüberalfa YM 3-30 | <ul style="list-style-type: none"> <li>• Longer contact life and equipment availability as Klüberalfa YM 3-30 protects the contact against harmful influences</li> <li>• Klüber YM 3-30 Spray is a slip-ring oil with long-term resistance and a particular low base oil viscosity</li> </ul> |





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Klüber Lubrication – the world market leader  
in speciality lubricants**

- subsidiaries in over 30 countries
- more than 1 700 staff
- products available worldwide

Klüber Lubrication offers expert tribological solutions. Through our worldwide presence, we meet customers needs reliably and on time. We supply tailor-made speciality lubricants to customers from nearly all branches of industry and around the world – oils, greases, bonded coatings, pastes and many more. Over 75 years of experience, industry-specific know-how, and exceptional test facilities all help to optimise our solutions.



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