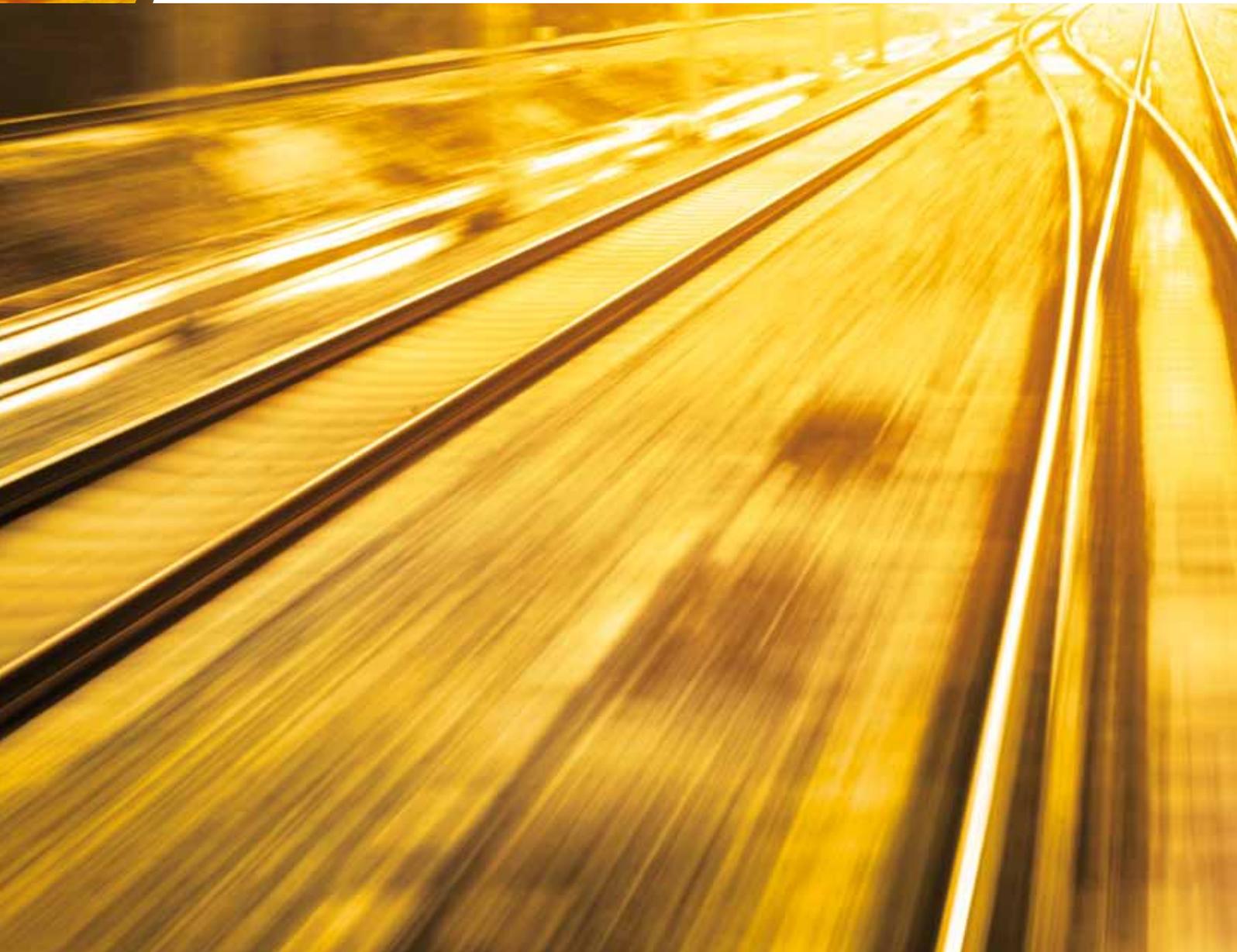


your global specialist

Industrial sector

On the track to success.

Speciality lubricants for the railway industry





Speciality lubricants from Klüber Lubrication – for more reliability and efficiency	3
Gearboxes	4
Lubricating traction motor bearings	5
Lubricating railway switches	6
Optimally equipped with our speciality lubricants	8
Drives and chassis	10
Bogies	12
Coaches and connectors	14
Infrastructure	16

Speciality lubricants from Klüber Lubrication – for more reliability and efficiency

Clearing the line with high-quality speciality lubricants

With speciality lubricants from Klüber Lubrication you make sure the complex interaction of trains and infrastructure is kept running. The right lubricant for the maintenance of bogie components, doors and points will reduce operating costs reliably and efficiently.

On the track to success with the right lubricant

Trouble-free functioning of trains and the infrastructure must be ensured to keep to schedule. The lubrication of points is therefore essential. Should a point fail to switch due to insufficient lubrication, the timetable will be disrupted, possibly affecting the whole rail network. Although a very small factor, insufficient lubrication can cause delays of several hours in the entire network, cancellations and customer complaints.

The rail industry therefore started taking an holistic view of maintenance and repair costs. How does a single factor influence the entire system? Lubricants that seem inexpensive at first may bring savings in points lubrication, but result in considerably higher costs of the entire operation, particularly if the lubricant shows poor performance, which entails shorter relubrication intervals.

Selecting the right lubrication partner is crucial to meeting all requirements of the rail industry.

Lubricants made by Klüber Lubrication: suited to the needs of the rail industry for maximum benefit

Speciality lubricants made by Klüber Lubrication make a considerable difference: For more than 80 years the special requirements of rail industry users have been a central concern of our work. We analyse the lubrication requirements of the components together with our customers and take the defined specifications as a basis for developing customised lubricants.

Besides high-quality, mineral oil based lubricants we also offer a comprehensive range of synthetic high-performance speciality lubricants that contribute to better efficiency of rail vehicles and higher infrastructure uptime. Our speciality lubricants help extend maintenance intervals and reduce lubricant quantities. With our eco-friendly and readily biodegradable lubricants, we support your efforts to preserve the environment and make a major contribution to environmental protection.

We are where you are

It is our aim to offer you high-quality speciality lubricants and services around the globe along with the high technical competence Klüber Lubrication is known for. We meet this aim through our worldwide network of production and sales companies, competent dealers and last, but not least, through our highly specialised experts ready to respond to your individual requirements.

We have compiled a selection of speciality lubricants and listed them according to modules and components. These lubricants have proven effective in trains and switches, some of them for decades.

Gearboxes



Rail vehicle gearboxes are subject to high stress, high loads, high speeds and vibrations. They must withstand these stresses while providing high efficiency and reliability. To meet such requirements, these gearboxes need to be oil lubricated. Our solution for such high requirements is Klübersynth GE 4 75 W 90.

This fully-synthetic high-performance polyalphaolefin (PAO) based gear oil has a high stability and protects the gear under shock load. We developed Klübersynth GE 4 75 W 90 especially for rail vehicle gears. It shows excellent performance even under high stress.

Klübersynth GE 4 75 W 90 offers a high scuffing load capacity of API-GL-5 and can therefore be used for those gearboxes requiring API-GL-4 or API-GL-5 standards. It protects gearwheels and rolling bearings reliably against wear and contributes to longer component life. Our speciality lubricant helps you to reduce maintenance work and costs.

Klübersynth GE 4 75 W 90 also provides high micropitting resistance (GFT ≥ 10 according to FVA 54/7), reliably protecting gear flanks susceptible to damage. Its good shear stability ensures a continuous, effective and reliable lubricant film even under high loads.

The excellent anti-ageing and oxidation stability of the synthetic base oil facilitates considerably longer oil change intervals compared to mineral oils, contributing to longer service intervals and reduced maintenance costs.

Gear components also function reliably with Klübersynth GE 4 75 W 90 at low temperatures. Additionally, this speciality lubricant is approved by many manufacturers and railway operators, e.g. WATTEUW, Voith Turbo, Siemens-Flender, Bombardier, CSR Zhuzhou and Deutsche Bahn AG.

Lubricating traction motor bearings



Traction motors are expected to run reliably, which is why the lubricants used should be effective in practice. Many of our customers have very good experience with our speciality lubricants and have also performed used grease analyses for different mileages. These analyses show that our lubricants work reliably in traction motors and provide sufficient lubrication capacity.

Influencing factors on the total cost of ownership of a traction motor

The total cost of ownership of a traction motor is mostly a result of the bearing lifetime, as exchanging the bearings incurs high costs and long downtime. Access to the bearings requires the motor and gearbox to be separated from the bogie and the reverse on reassembly. As the process steps involve considerable costs, it makes a big difference in the total cost of ownership if bearings last for one to three million kilometres.

Klüber Lubrication provides two different product concepts for the lubrication of traction motor bearings:

ISOFLEX TOPAS L 152 is best used for traction motors in which the bearing temperature is normally not much higher than 100 °C. The oil release characteristics of this fully synthetic rolling bearing grease are ideal for continuous oil supply to the rolling contact, even for linear contact as in cylindrical roller bearings. Additionally, ISOFLEX TOPAS L 152 is particularly resistant to ageing and oxidation and thus an excellent solution for long-term lubrication in this application. Good wear protection at varying speeds and loads complements the speciality lubricant's profile. Our product has proven successful in many applications from high-speed trains to locomotives and streetcars.

The grease maintains its lubricity in traction motor bearings also after many years of use and stays smooth, ensuring old grease is replaced by new during relubrication and assuring reliable operation. The combination of fully synthetic base oil and a special lithium soap thickener enables the use of ISOFLEX TOPAS L 152 at temperatures down to minus 50 °C with minimum friction coefficients, ensuring safe start-up in challenging climates.

We recommend our patented hybrid grease Klübersynth BHP 72-102 for traction motor bearings constantly operated at temperatures considerably above 100 °C. The synthetic long-term grease is designed for highly loaded rolling bearings to extend lubrication intervals considerably compared to conventional lubrication. Klübersynth BHP 72-102 stands out for its excellent corrosion protection and water resistance. Our special grease ensures very good component availability in corrosive environments and under heavy vibrations. This powerful hybrid grease has shown to run for hundreds of thousands of kilometres without relubrication in practice.

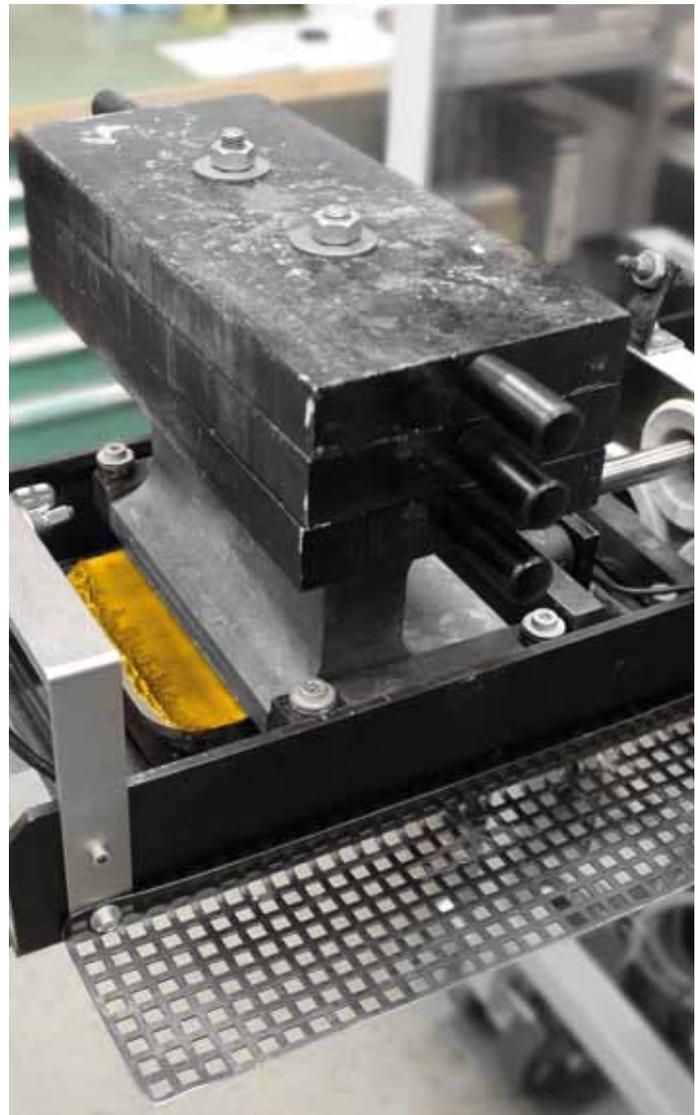
Lubricating railway switches

One of the most important maintenance tasks of railway and infrastructure operators is ensuring trouble-free functioning of switches under all weather conditions. Suitable high-performance lubricants increase the reliability of switches and have a positive effect on total costs.

A railway switch lubricant must have certain characteristics to ensure long relubrication intervals. These include a low friction coefficient, high corrosion and wear protection, good adhesion to the slide plate, very high water and UV resistance and easy application - even at low temperatures. Another important aspect is continuously increasing environmental protection requirements. Conventional biodegradable lubricants, however, often offer a lower performance than standard lubricants. The key challenge for us during the development of railway switch lubricants was to combine biodegradability with high performance. All our railway switch lubricants are now rapidly biodegradable according to OECD standard 301 while providing high performance.

The most important task of a high-performance railway switch lubricant is to ensure low switching forces for a long time. It is difficult to measure the switching forces on a real-life switch over a long period of time, so we have developed a special test rig for our customers to simulate actual conditions and to measure the forces in each setting cycle. Various test cycles can be run and specific operating conditions simulated.

Our railway switch test rig can measure the switching forces at different temperatures. A 30-minute simulation can be used to determine the influence of rain on switching forces. The tests have shown that friction forces increase only slightly under the influence of rain with our railway switch lubricants like Klüberbio ALO 32-4000, which also offer very good corrosion protection. Its good corrosion protection was also proven on the slide plates.

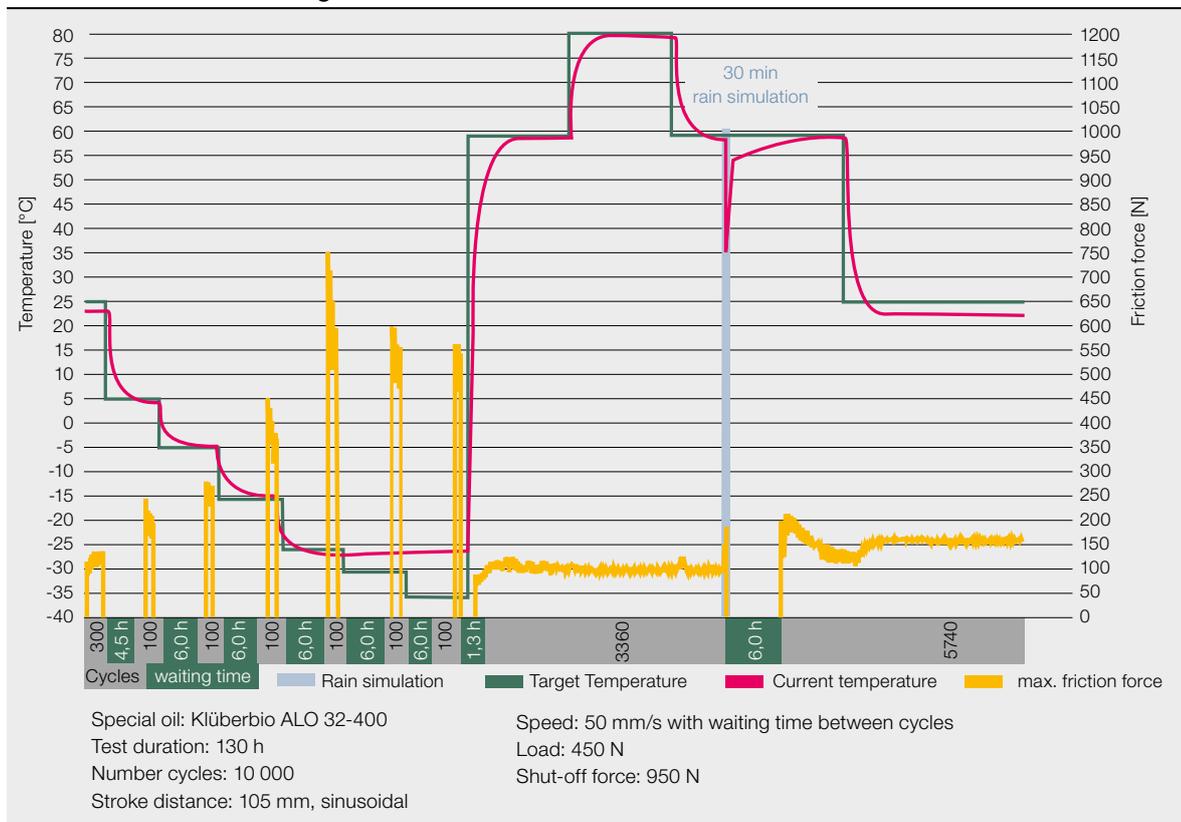




Rain simulation in the railway switch test rig

Klüberbio ALO 32-4000 maintains its performance characteristics also after periods of rain.

Klüber Rail Switch Test Rig



With this test rig, we were able to develop a portfolio of railway switch lubricants that meets the different requirements of infrastructure operators.

Klüberail AL 32-2000

- Low viscosity, sprayable down to -20 °C
- Good corrosion protection
- Long relubrication intervals
- Colour: beige

Klüberail AL 32-3000

- Sprayable down to -15 °C
- Very good corrosion protection
- Long relubrication intervals
- Colour: beige

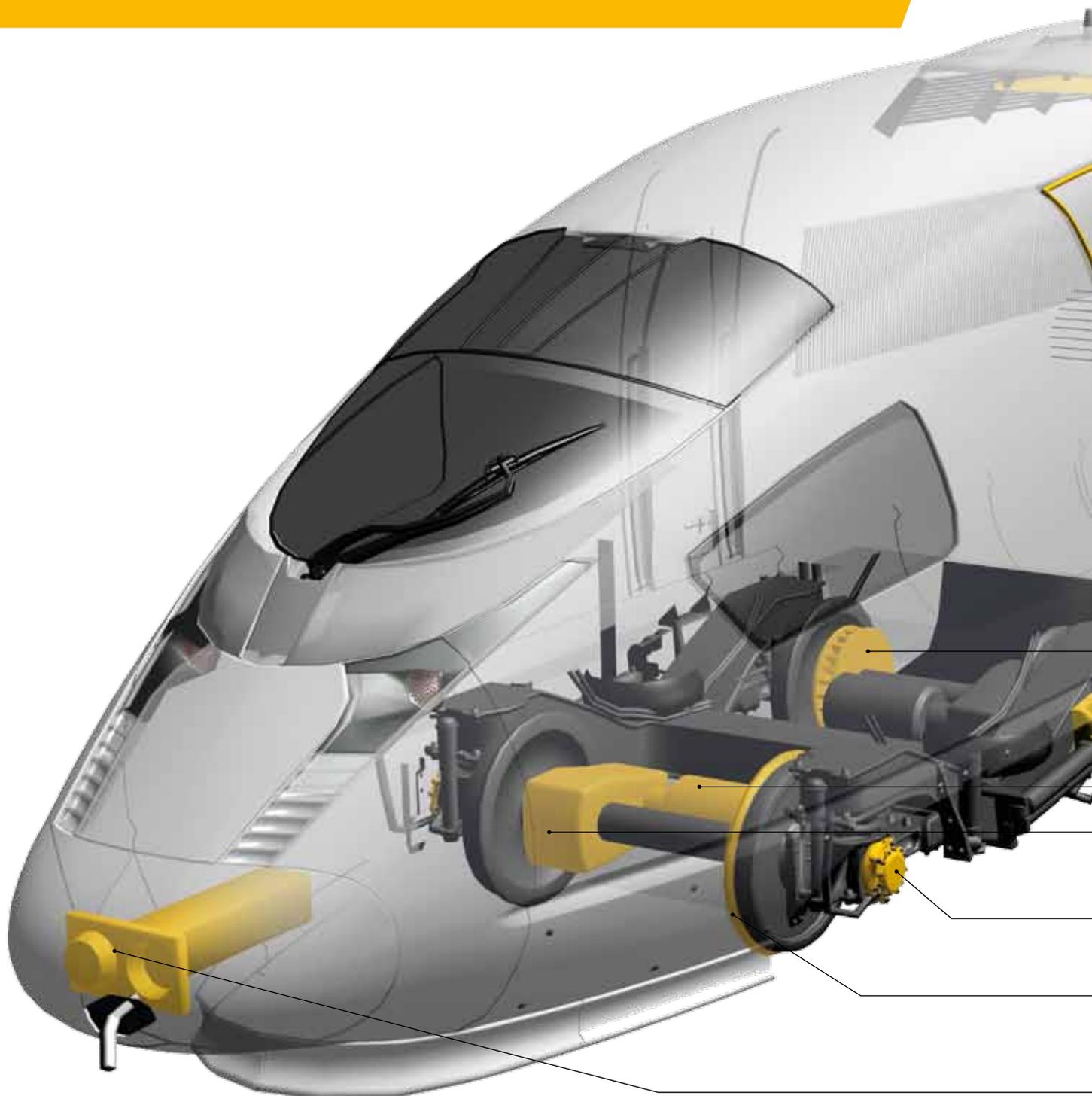
Klüberbio ALO 32-4000

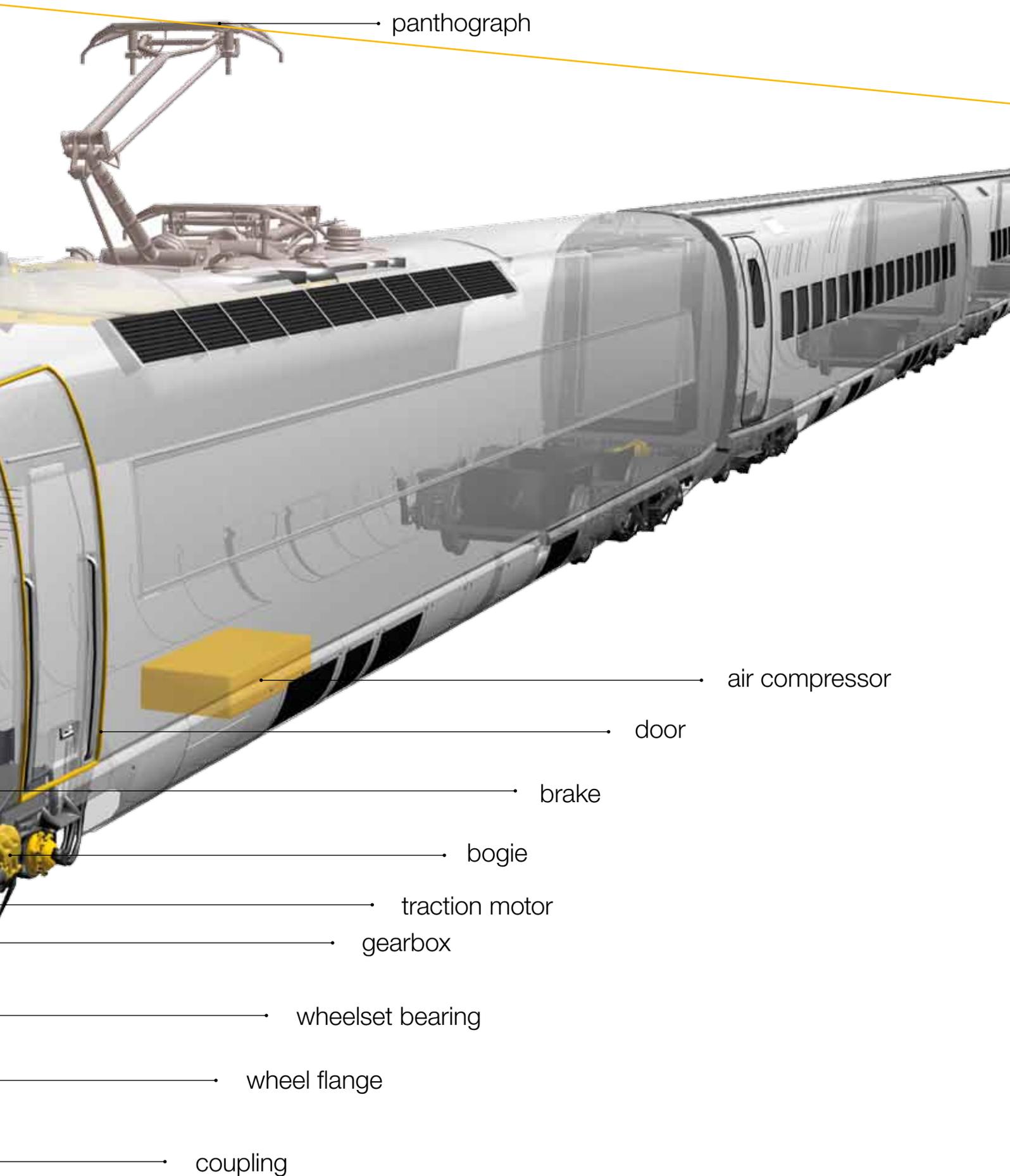
- Applicable by brush and sprayable down to -5 °C
- Very good corrosion protection
- Very long relubrication intervals
- Colour: beige

Klüberbio LO 32-2500

- Paste-like consistency
- Applicable by brush
- High percentage of solid lubricant particles (graphite)
- Colour: black

Optimally equipped with our speciality lubricants





pantograph

air compressor

door

brake

bogie

traction motor

gearbox

wheelset bearing

wheel flange

coupling

Drives and chassis

	Module	Application	Lubricant composition
	traction motor bearings	service temperature < 100 °C permanently	fully-synthetic hydrocarbon oil with lithium soap
		service temperature > 100 °C permanently	ester oil mixed with PFPE, PTFE and a polyurea thickener
	wheelset gears		fully-synthetic hydrocarbon oil with high additivation
	wheelset	cylindrical and tapered rolling bearings	base oil mixture of mineral oil and PAO with lithium complex soap thickener
		bolts of wheelset bearing housing	mineral oil with barium complex soap and a high percentage of solid lubricant
	curved gear couplings	gear teeth	mineral oil with lithium complex soap and a high percentage of solid lubricant
	disc brakes	bolts, bushes, slideways	mineral oil with barium complex soap and a high percentage of solid lubricant
	block brakes	plain bearings, linkages, guides, screw connections	mineral oil with aluminium complex soap and a high percentage of light-coloured solid lubricant

© picture traction motor by Bombardier Transportation.

© picture curved gear couplings by RENK Aktiengesellschaft, Werk Rheine.



Product	Benefits for your application
ISOFLEX TOPAS L 152	<ul style="list-style-type: none"> - Extended relubrication intervals - Good thermal resistance - Low start-up torque at low temperatures - Tried-and-tested for many years by international OEMs and operators
Klübersynth BHP 72-102	<ul style="list-style-type: none"> - Very good performance at high bearing temperatures - Long relubrication intervals - Successfully used by international OEMs and operators
Klübersynth GE 4 75 W 90	<ul style="list-style-type: none"> - Fully synthetic gear oil with special additives for particularly high thermal resistance - Complies with API-GL5 requirements - Considerably extended oil change intervals compared to mineral oil-based gear oils - Approvals from important gear manufacturers like Voith Turbo, Watteeuw, Siemens-Flender and Deutschen Bahn available
Klüberplex BEM 41-132	<ul style="list-style-type: none"> - Long-term rolling bearing grease with very good wear, corrosion and ageing resistance - Particularly suitable for rolling bearings with high percentage of sliding friction
STABURAGS NBU 30 PTM	<ul style="list-style-type: none"> - For easy dismantling of screw connections, also after longtime use - Protects against tribo-corrosion - Very good water and media resistance - Good corrosion protection - Also available as spray - Friction value 0.09 - 0.14
Klüberlub BE 41-1501	<ul style="list-style-type: none"> - Heavy-duty grease - Very good wear protection due to high percentage of solid lubricant and EP/AW additives
STABURAGS NBU 30 PTM	<ul style="list-style-type: none"> - Very adhesive assembly grease - For easy dismantling of fasteners after longtime use - Protects against tribo-corrosion - Very good water and media resistance - Good corrosion protection - Friction value 0.09 - 0.14
Klüberplex AG 11-462	<ul style="list-style-type: none"> - Light, very adhesive yet easily spreadable grease - For easy dismantling of fasteners - Good water resistance - Good corrosion protection

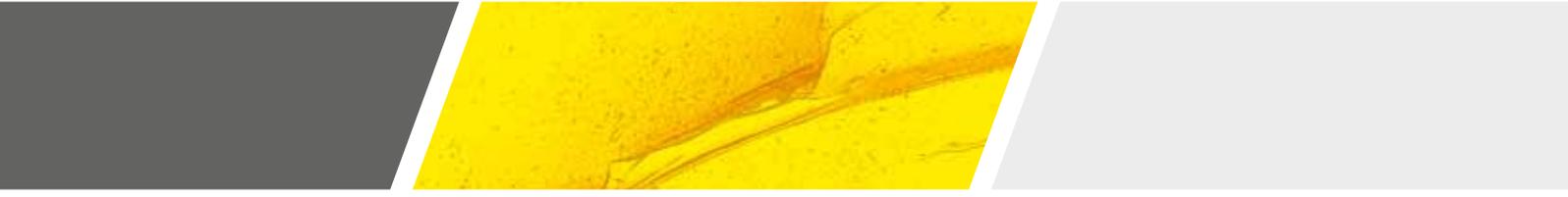
Bogies



Module	Application	Lubricant composition
bogies	screw and bolt connections	mineral oil with barium complex soap and a high percentage of solid lubricant

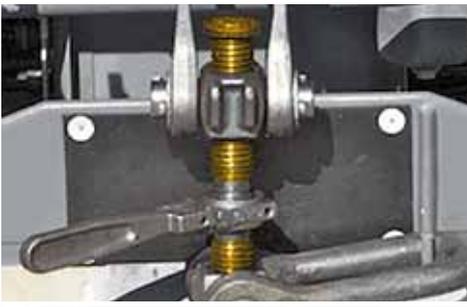


bogie wheels	wheel flanges	ester oil with bentonite thickener and solid lubricant
--------------	---------------	--



Product	Benefits for your application
STABURAGS NBU 30 PTM	<ul style="list-style-type: none">- For easy dismantling of fasteners, also after longtime use- Protects against tribo-corrosion- Very good water and media resistance- Good corrosion protection- Also available as spray- Friction value 0.09 - 0.14
Klüberail LEA 62-2000	<ul style="list-style-type: none">- Sprayable fluid grease- Lubricant is not flung off the wheel flange, even at high speeds- Good wear protection- Good water resistance- Rapidly biodegradable acc. to. OECD 301 F

Coaches and connectors

	Module	Application	Lubricant composition	
	doors	functional surfaces, locks, springs, star wheels, mounting rails, torsion springs	hydrocarbon oil with barium complex soap	
	linear guides/drive spindles	mineral/ester oil mixture with lithium soap		
	seals, T > -25 °C	PFPE oil with PTFE thickener		
	seals, T < -25 °C	PFPE oil with PTFE thickener		
	buffer heads		mineral oil with aluminium complex soap and a high percentage of light-coloured solid lubricant	
		Calcium soap with ester oil and solid lubricants		
	Screw coupling		Aluminium complex soap with mineral oil and a high percentage of light-coloured solid lubricants	
		Calcium soap with ester oil and solid lubricants		
	automatic couplings	couplings, coupling heads, main bolts, coupling rods, electronic couplings, etc.	hydrocarbon oil with calcium complex soap	
	air compressors		hydrocarbon oil with additives	
		ester oil with additives		



Product	Benefits for your application
ISOFLEX TOPAS NB 52	<ul style="list-style-type: none"> - Fully synthetic long-term grease with good wear protection - Very good water and media resistance - Good low-temperature characteristics - Good oil retention for better adhesion, also at high temperatures - Successfully used by international OEMs and operators - Also available as spray
ISOFLEX LDS 18 Spezial A	<ul style="list-style-type: none"> - Dynamically light long-term grease - Good corrosion protection - Good water resistance - Low friction coefficient at high speeds - Low start-up torque, also at low temperatures
BARRIERTA L 25 DL	<ul style="list-style-type: none"> - Smooth opening and closing of doors, especially at low temperatures - Good UV protection for longer seal life - Neutral towards EPDM and silicone seals
BARRIERTA KL 092	<ul style="list-style-type: none"> - Silicone-free - no impairment of coating processes during chassis repair
Klüberplex AG 11-462	<ul style="list-style-type: none"> - Very adhesive grease - High percentage of special solid lubricant for very good wear protection - Good corrosion protection - No dropping, even at high temperatures - Also available as spray
Klüberbio AG 39-602	<ul style="list-style-type: none"> - Biodegradable acc. to OECD 301 F - Base oil composed of native base oils - Good adhesion and water resistance - Does not dip off even at high temperatures - Good corrosion protection
Klüberplex AG 11-462	<ul style="list-style-type: none"> - Excellent adhesion - Very good water resistance - Good corrosion protection - Extended relubrication intervals - Easy-to-use spray
Klüberbio AG 39-602	<ul style="list-style-type: none"> - Biodegradable acc. to OECD 301 F - Base oil composed of native base oils - Good adhesion and water resistance - Does not dip off even at high temperatures - Good corrosion protection
ISOLFEX TOPAS NCA 52	<ul style="list-style-type: none"> - Smooth operation, even at low temperatures - Good corrosion protection - Very good wear protection
Klüber Summit SH 46 /68	<ul style="list-style-type: none"> - Fully-synthetic oil for long relubrication intervals. - High evaporation stability - Low formation of oxidation residues in the oil circuit
Klüber Summit Ultima 46 /68	<ul style="list-style-type: none"> - Fully-synthetic oil for considerably longer relubrication intervals. - High evaporation stability and hence clean (oil-free) compressed air - Low formation of oxidation residues in the oil circuit

Infrastructure

	Module	Application	Lubricant composition	
	points	spray application with spray equipment on slide plates, sprayable down to -20 °C	ester oil with calcium soap, very thin consistency	
		spray/brush application on slide plates, sprayable down to -10 °C	ester oil with calcium soap, thin consistency	
		brush application on slide plates	ester oil with calcium soap, slightly viscous consistency	
	power supply	contact wire - winter	ester oil with calcium soap and solid lubricant	
		contact wire - summer	Ester oil with calcium soap and solid lubricants	
	Electrical contacts	Without thermal loads	Special lithium soap with fully synthetic hydrocarbon	
		With thermal loads	PFPE oil with PTFE thickener	



Product	Benefits for your application
Klüberail AL 32-2000	<ul style="list-style-type: none"> - Readily biodegradable, eco-friendly lubricant - Low switching forces in points, also at low temperatures - Good water resistance
Klüberail AL 32-3000	<ul style="list-style-type: none"> - Good corrosion protection - Long relubrication intervals - Easy application with portable spray equipment
Klüberbio ALO 32-4000	<ul style="list-style-type: none"> - Readily biodegradable for good environmental compatibility - Low adjustment forces of the point, also at low temperatures - Good water resistance - Good corrosion protection - Long relubrication intervals - To be applied preferably by brush
Klüberbio LO 32-2500	<ul style="list-style-type: none"> - Considerably less wear on contact wires - No drip off - Reduces contact wire oscillations
Klüberbio ALO 32-250	<ul style="list-style-type: none"> - Minimises noise - Good corrosion protection - Less sparking
Klüberlectric KR 44-402	<ul style="list-style-type: none"> - Reduced plug-in and switching forces - Less fretting corrosion - Very good corrosion protection of copper, tin and silver surfaces - Considerably longer service life due to excellent ageing resistance and oxidation stability - Good compatibility with plastics
BARRIERTA KM 192	<ul style="list-style-type: none"> - Very good thermal stability - Reduces switching forces - Considerably longer service life due to excellent ageing resistance and oxidation stability - Good compatibility with plastics





Publisher and Copyright:
Klüber Lubrication München SE & Co. KG

Reprints, total or in part, are permitted only prior consultation with Klüber Lubrication München SE & Co. KG and if source is indicated and voucher copy is forwarded.

The data in this document is based on our general experience and knowledge at the time of publication and is intended to give information of possible applications to a reader with technical experience. It constitutes neither an assurance of product properties nor does it release the user from the obligation of performing preliminary field tests with the product selected for a specific application. All data are guide values which depend on the lubricant's composition, the intended use and the application method. The technical values of lubricants change depending on the mechanical, dynamical, chemical and thermal loads, time and pressure. These changes may affect the function of a component. We recommend contacting us to discuss your specific application. If possible we will be pleased to provide a sample for testing on request. Products from Klüber Lubrication are continually improved. Therefore, Klüber Lubrication reserves the right to change all the technical data in this document at any time without notice.

Klüber Lubrication München SE & Co. KG
Geisenhausenerstraße 7
81379 München
Germany

Local first-instance court Munich, Germany
Certificate of registration 46624

www.klueber.com

Klüber Lubrication – your global specialist

Innovative tribological solutions are our passion. Through personal contact and consultation, we help our customers to be successful worldwide, in all industries and markets. With our ambitious technical concepts and experienced, competent staff we have been fulfilling increasingly demanding requirements by manufacturing efficient high-performance lubricants for more than 80 years.

