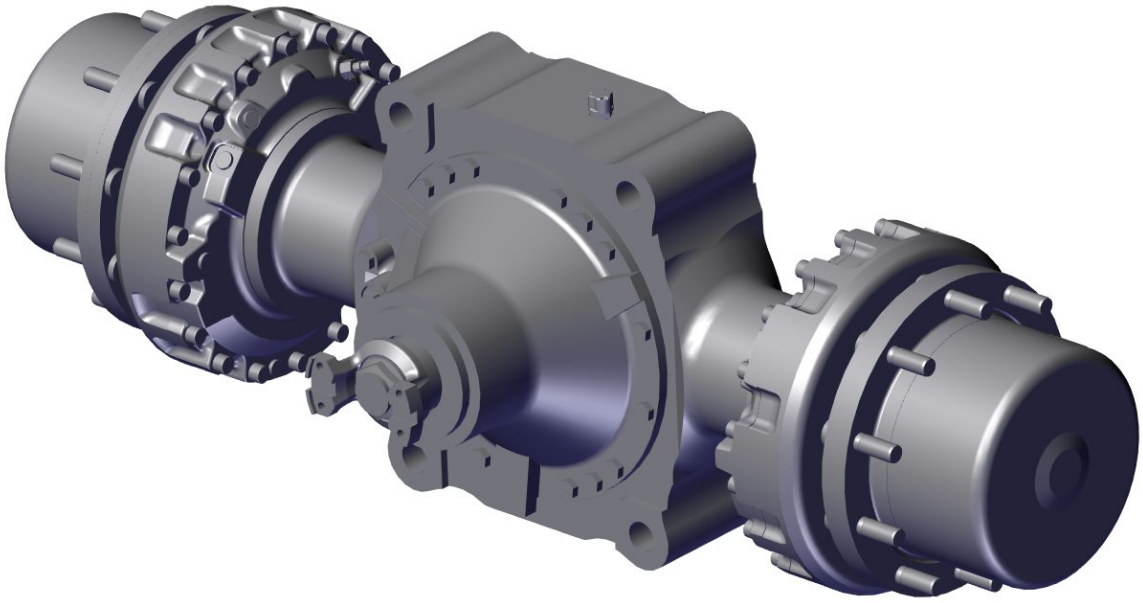
DRIVE AXLE
SERVICE MANUAL



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1 Safety

1.1 Structure of warning notices

SIGNAL WORD

Type and source of the danger

Consequences if ignored

➢ Measure

1.2 Explanation of the usual warning notices and symbols

⚠ DANGER	
	**Indicates a direct danger.** If not avoided, death or serious injury will result.

⚠ WARNING	
	**Indicates a possibly dangerous situation.** If not avoided, death or serious injury may possibly result.

⚠ CAUTION	
	**Indicates a possibly dangerous situation.** If not avoided, injury may possibly result.

NOTICE	
	Indicates situations where material damage can occur.

NOTE
Indicates important information, application tips, and useful notes for proper working practices.

General warning sign that draws attention to potential dangers.

Warning against danger of burns or cut injuries. Protective gloves must be worn.

1.3 Basic safety instructions

The following safety instructions must be read and observed before work is started on RICO products.

Product safety

Axles, gearboxes, drive assemblies, wheel gears, and wheel ends produced by RICO (referred to as RICO products in the following) are developed, designed and manufactured according to German and European technical regulations.

Work on RICO products may only be carried out in compliance with the technical rules and safety regulations valid at the operating site.

- Valid health, work, and fire-protection regulations
- Laws, directives, and safety regulations

Organizational and personnel matters

Fundamental principles: axles, gearboxes, drive assemblies, wheel gears, and wheel ends produced by RICO may only be put into operation in a technically fault-free condition, when used as intended and being mindful of safety and danger while observing the instructions. Remove defects immediately, especially those which might adversely affect safety. The operation of defective and improperly maintained, repaired or retrofitted axles, gearboxes, drive assemblies, wheel gears and wheel ends is not permitted under any circumstances! Carry out all activities in a responsible and safety-oriented manner. Furthermore, all markings and labels on axles, gearboxes, wheel gears, and wheel ends of RICO must be legible.

Scope of validity: The documentation is valid for all persons who work on RICO products. Before work is carried out on the vehicle, the documentation must be read completely and closely observed. If there are questions or something cannot be understood, RICO must be consulted.
The documentation should be stored near the RICO products and be accessible for the personnel at any time. The documentation is part of the RICO products and must be available in its entirety during the entire service life.

Competences: Work on RICO products may only be carried out by trained technicians such as motor vehicle mechanics or persons with comparable vocational training.

Product-specific dangers

Transport, installation, maintenance, repair, and conversion work: Activities between or on moving subassemblies must be avoided as there is a danger of crushing or shearing.

The unpredictable own weight of RICO products or individual parts can cause them to fall or tip over unexpectedly.

- Employ only suitable, undamaged, and approved cranes and slinging means for the load in question.
- Do not stand under suspended loads.
- Secure parts with tension belts and/or suitable supports.
- Wear safety shoes.

All maintenance specifications in this documentation must be observed.

All work must be carried out at a clean workplace.

The instructions in this documentation assume that the RICO product has been disassembled and is fixed onto a device for further processing. Read the vehicle manufacturer's instructions on how to dismantle the products from the vehicle.

Work on a product may only be carried out when permissible by the temperature of the respective component.

- Make sure that oil has cooled down before draining it.
- Make sure that rotating parts have cooled down before starting disassembly.
- Wear fire-proof gloves.

Brake: When working on the brake it must be ensured that no unintended machine movement can occur when the brake mechanism is disengaged.

The brake is a safety component of the first order; improper work on it may cause the brake to fail.

Rim and tire: Never stand directly in front of the rim when air is released or during inflation. Parts may suddenly come loose and be ejected due to the inner pressure of the tire.

The air needs to be released completely from the tire beforehand when disassembling versions with clamped rim fixation. Be sure to observe the tightening torques and maintenance of the wheel nuts and clamps.

Lubricants and auxiliary materials: Be sure to observe the manufacturer's safety data sheets when handling lubricants and auxiliary materials (e.g. oils and greases).

Oils and greases can trigger allergic reactions on skin. For this reason, appropriate protective clothing must be worn.

Loose-fitting clothing and long loose hair is prohibited when working on products!

When metal parts are being machined where there is a risk of shattering (grinding, deburring, cleaning with compressed air, etc.), bits of metal may be flung out that can injure the eyes. For this reason, safety goggles must always be worn.

RICO offers customer service tools that make working on axles, gearboxes, wheel gears, and wheel ends easier and safer.

Repair welding is only permitted after consultation with RICO!

Before reassembling used parts, they must be checked for damage, fault-free contact surfaces and wear. In particular, check that there are no chips or other foreign bodies in the axles, gearboxes, wheel gears, and wheel ends.

After carrying out maintenance and repair work, check that the product functions properly.

2 Intended use

Axles, wheel gears, wheel ends, drive assemblies or gearboxes may only be installed and operated in vehicles for which they have been designed. RICO products may not be operated when they have been dismantled.

6 Startup

6.1 Painting

- When painting the RICO product, the radial seal rings must be protected from paint.

6.2 Lines

- Connect lines only when they are not pressurized.

6.3 Filling oil

- RICO products are generally shipped without oil; they therefore need to be filled with oil.
- Always check the oil filling before startup, even if a RICO product was delivered with an oil filling as ordered.
- Make sure the correct oil quality is used for filling, see "Oils" on page 18.
- Check the oil level, see "Oil change" on page 20.
- Take separate oil spaces and pre-filling into account, e.g. at drop gear and through drive assembly or at gear boxes assembled onto axles.

Oil quality for wet multiple disk brake with external cooling

- Make sure the correct oil quality is used for filling, see "Approved oils for brake with external cooling" on page 19.

6.4 Brakes

⚠ DANGER	
	**Brake failure due to ignoring of regulations during startup.** Serious injury ➢ When working on the brakes, make sure that no unintended vehicle movement can occur when the brake mechanism is disengaged. ➢ The vehicle manufacturer has to carry out a documented brake test before releasing the vehicle.

- Use specified actuation medium, see installation drawing as well as the brake manufacturer's instructions.
- Observe the permissible maximum actuation pressures according to the installation drawing, brake calculation, brake specification sheets or the brake manufacturer's instructions.
- Check that the position of the brake connections is correct according to the installation drawing.
- Bleed the actuation space / piston space of the brakes, see respective instructions of the brake manufacturer.

- Check the proper function of the brakes.
- On combination operational and parking brakes, an overload of brake components needs to be prevented during joint actuation of the operational and parking brake by installing a suitable protection valve.
- The vehicle manufacturer must observe the running-in instructions of the brake manufacturer and RICO.
- The vehicle manufacturer has to carry out a documented brake test before final startup of the vehicle.

6.4.1 Wet multiple disk brake

Brake cooling

- Observe the position of the connections, in particular the cooling oil connections, see installation drawing / "Technical data" on page 5.
- External cooling of the wet multiple disk brake is necessary. A model without cooling is only permissible with the express approval of RICO.
- Approved oils for cooling (attention: observe LS additives) see RICO company standard WN85601 and WN85602.
- The amount of cooling oil needs to be specified according to vehicle usage. Representative test drives with the vehicle are necessary to verify sufficient cooling.
- The cooling oil pressure at the cooling oil outlet must not exceed 1 bar. Pressures up to 5 bar are permissible at the cooling oil inlet however.
- The cooling oil temperature at the cooling oil outlet must not exceed 100°C. The cooling oil temperature at the cooling oil inlet must therefore not exceed 70°C.
- The cooling oil circuit should be designed with a tank that allows for a dewatering of the oil. Water in the oil can cause the brake linings to come loose!

Brake actuation

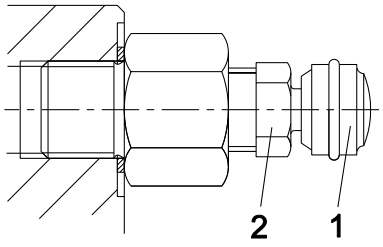
- Observe the respective brake specifications sheet WN 63…. according to the technical specification field on the installation drawing / "Technical data" on page 5.
- Approved oils for actuation; see RICO company standard WN85601 and WN85602. Use only mineral oils!
- Check the permissible maximum residual pressure in non-actuated condition according to brake specifications sheet!
- Constant pressure at the brake actuation is not permissible!

6.4.2 Bleeding the wet multiple disk brake

The brake system needs to be bleeded before starting up the vehicle.

⚠ WARNING	
	**When work is being performed on the brake, its braking effect is disabled.** Rolling away of the vehicle ➢ Make sure that no machine movements can take place.

⚠ CAUTION	
	**Oil and bleeder valve are pressurized.** Injury due to parts being ejected ➢ Only trained technicians may bleed the brakes.



1. Make sure that no machine movements can take place.
2. Pressurize the brake.
   ➢ The brake closes.
3. Remove the protection cap (1) of the bleeder valve (2).
4. Slide the hose onto the bleeder valve.
5. Open the bleeder valve slowly by no more than 1/4 of a rotation.
   ➢ Oil-air mixture escapes through the hose.
6. Once only oil seeps out, close the bleeder valve again properly.
7. Pull off the hose.
8. Place the protection cap (1) onto the bleeder valve (2).

6.4.3 Running-in instructions

Running-in instructions for wet multiple disk brakes:

➢ When starting up the vehicle, drive carefully to bring the brakes to the operational temperature.

➢ Drive carefully to get used to the brake effect.

6.5 Rim

- Check permissible rim offset according to the installation drawing / **"Technical data" on page 5**.
- Contact surface for rim and fastening parts of the rim have to be level, clean and free of grease.
- Check the clearance between rim and tire to the neighboring axle parts.
- On steerable axles, check the clearance, in particular at full steering angle.

6.5.1 Rim attachment

Wheel nuts

- Use correct types of wheel nuts and tighten with controlled tightening torques in accordance with specifications on "Tightening torque wheel nut" on page 37.
- Check the wheel nuts after a few operating hours and retighten. See " Maintenance intervals" on page 24

6.6 Drive flange

- Contact surfaces have to be clean and free of grease.
- Observe the reduced tightening torque for galvanized screws, see "Tightening torques" on page 37

6.7 Exhausting The Drive Axle

Where applicable, breather are usually delivered separately.

- Mount breather.
- Check breather for correct function.

7 Checklist for the installation and startup of a RICO product

For safety instructions and required work/tasks, refer to the chapter Installation and startup.	Completed		
Items to be checked:	**yes**	**no**	**Remarks**
Installing a RICO product after a longer storage period • Special measures observed before startup after storage?	☐	☐	
Moving RICO product • Capacity of the hoisting device and the slinging means sufficient for the RICO product? • Is the RICO product to be moved secured at two steelwork components (suitable for the load)?	☐ ☐	☐ ☐	
Installation position • Driving direction and installation angle observed?	☐	☐	
Lines • All lines connected?	☐	☐	
Rim • Permissible rim offset checked according to the installation drawing? • Clearance between rim and neighboring axle parts checked?	☐ ☐	☐ ☐	
Rim attachment • Is the contact surface for rim and fastening parts of the rim to be level, clean and free of grease? • Correct fastening parts used? • Fastening parts tightened with the correct tightening torque? • Retighten the fastening parts regularly after short running interval!	☐ ☐ ☐ ☐	☐ ☐ ☐ ☐	
Tires • Clearance between tires and neighboring axle parts checked? • Tire pressure correct according to vehicle manufacturer's specifications?	☐ ☐	☐ ☐	

For safety instructions and required work/tasks, refer to the chapter Installation and startup.	Completed		
Items to be checked:	**yes**	**no**	**Remarks**
Inlet direction of rotation / driving direction correct?	☐	☐	
Oil filling			
• Oil quality used correct?	☐	☐	
• RICO product filled to correct oil level?	☐	☐	
• Separate oil spaces (drop gear and through drive assemblies, ...) filled?	☐	☐	
• Recheck oil level after brief startup!	☐	☐	
Brakes			
• Actuation medium correct?	☐	☐	
• Actuation pressure checked?	☐	☐	
• Max. permissible residual pressure checked?	☐	☐	
• Brake properly connected?	☐	☐	
• Cooling oil medium of the brake correct?	☐	☐	
• Actuation space, piston space of the brake bled?	☐	☐	
• Function tested?	☐	☐	
• Running-in instructions observed?	☐	☐	
• Brake test carried out?	☐	☐	
Drive flange			
• Contact surfaces clean and free of grease?	☐	☐	
• Screw connections tightened with the correct tightening torque?	☐	☐	
Exhauster			
• Exhauster mounted?	☐	☐	
• Function of the exhauster checked?	☐	☐	

8 Operation

The technical specifications such as the permissible axle load must be observed at all times when RICO products are operated.

Refer to the installation drawing / "Technical data" on page 5.

9 Maintenance

9.1 Lubricants and lubrication intervals

Lube point	Lubricant	Remarks	Lubrication intervals (The value that is reached first is always valid.)				
			after 100 hours of-operation 1000 km	every 500 hours of-operation 5000 km	every 1000 hours of-operation 10,000 km	at least 1 x per year	at least 1 x in 2 years
Differential and carrier assembly	Hypoid gear oil acc. to MIL-L2105 B/API GL5 Hypoid gear oil in multi-grade characteristic acc. to MIL-L2105 C/D/API GL5 SAE 90 o. multi-grade oils with normal outdoor temperatures SAE 75 W - 90; SAE 75 W - 85 at outdoor temperatures under -10 °C SAE 140 o. multi-grade oils with outdoor temperatures over +30 °C	Oil change monthly oil level check by overflow measurement	+		+	+	
Wheel hub – planetary gear			+		+	+	
Interaxle differential			+		+	+	
Drop gear assembly / Gearbox			+		+	+	
Wheel bearing oil-lubricated			+		+	+	
Multiple disk parking-brake	Hydraulic oil ISO VG 32	Oil change during wet running	+		+	+	
Cardan shafts-intermediate bearing	Fuchs-Renolit LX-NHU 2	if lubrication possible			+	+	
Steering knuckle bearing	Multi-purpose grease, lithium soap-based – worked penetration in accordance with NLGI 2 e.g. Fuchs Renolit MP 150		+	+			
Steering knuckle bearing		low maintenance			+	+	
Universal joint		if lubrication possible	+	+			
Track rod		if lubrication possible	+	+			
Steering cylinder ball joint / joint bearing		if lubrication possible	+	+			
Drive pinion bearing		if grease-lubricated	+		+	+	
Brake shaft bearing		Caution! (see 1.)	+	+			
Brake shoe bearing		Caution! (see 1.)	Lightly grease when mounting new brake shoes				
Wheel bearing		if grease-lubricated	Grease change during wheel hub disassembly				+
Wet multiple disk brake	see "Approved oils for brake with external cooling" on page 19	with external cooling: Oil change	depends on tank volume / cooling system / application				

1.) Bearing point may be lubricated with only a little grease so that no grease can penetrate the interior of the brake (use only manual grease gun and remove grease that seeps out!) Check ease of movement of the brake shafts regularly and correct the lubrication intervals if necessary (danger of running hot).

9.2 Oils

9.2.1 Recommended types of hypoid gear oil

For RICO axles, gear oil types with the specification MIL-L 2105 B/API GL 5 or MIL-L 2105 C/D/API GL 5 have to be used!

- ARAL - gear oil Hyp 90
- AVIA - gear oil Hypoid 90 EP
- BP - multipurpose gear oil EP SAE 90
- ELF - Tranself type B 90 / Tranself type B 80 W - 90
- ESSO - gear oil GX - D 90
- FINA - Pontonic MP SAE 85 W - 90
- FUCHS - Renogear Hypoid 90
- MOBIL - HD 90 - A
- SHELL - Spirax MB 90 / HD 90
- TEXACO - Multigear EP SAE 85 W / 90
- AGIP - Rotra MP / Rotra MP DB

9.2.2 Approved oils for brake with external cooling

Actuation fluid:

NOTICE	
	**Use only mineral oil as actuation fluid. Brake fluids are not permitted!**

Selection of mineral oils:

- Motor oil
  - API SE / CD
  - MIL – L 46152C / MIL – L 2104 C or D
- AFT C - 3 or Dexron ®
- Hydraulic oil HLP DIN 51524 part 2

Viscosity class depending on ambient temperature:

- for temperate climate: ISO VG 22 – 32
- for extremely cold climate: ISO VG 15
- for extremely warm climate: ISO VG 46

Cooling fluid:

NOTICE	
	**Only oils with LS additives that are approved by the vehicle manufacturer according to the RICO WN 85601 may be used.** ➢ e.g. 3 - 6% Lubrizol LZ 9990 A or LZ 6279

The cooling fluid can also be used as actuation fluid.

9.3 Oil change

9.3.1 Oil drain

⚠ CAUTION	
	**Hot oil** Burn hazard ➢ Make sure that oil has cooled down before draining it.

The precise position of the lube point can deviate from the illustration. The relevant lube point can be found on the RICO product on hand.

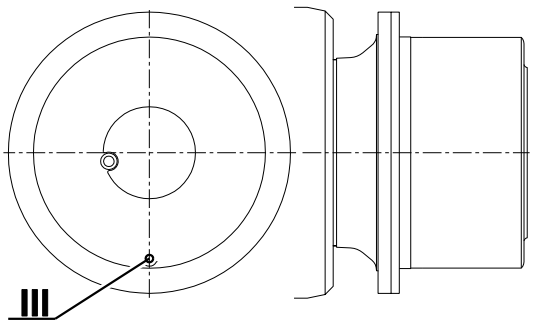
The axle has a total oil space.

Oil drain has to take place at the complete axle.

Wet multiple disk brake

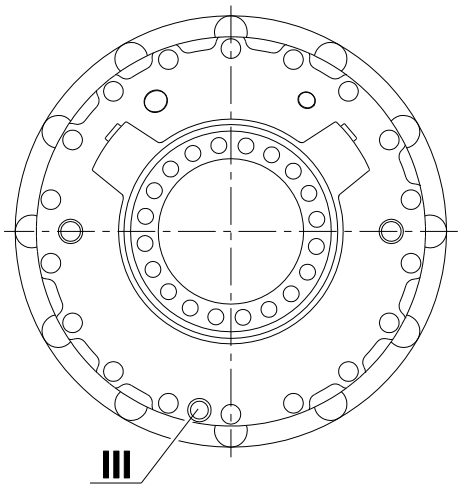
Drain the extra oil.

III = oil drain point



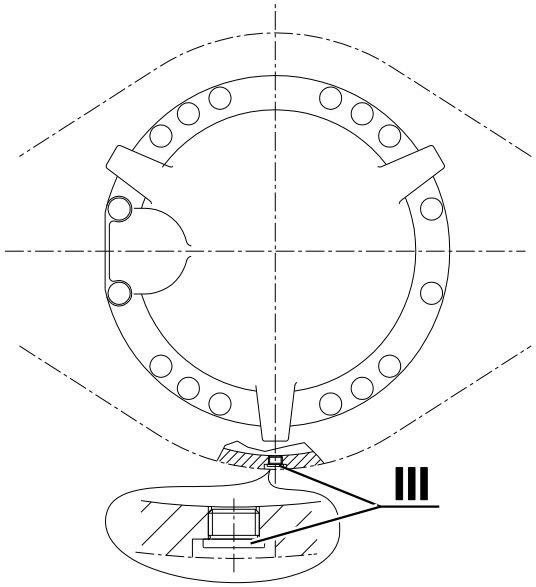
Oil drain, hub assembly:

1. Place axle in horizontal position.
2. Clean drainage point and oil drain plug.
3. Rotate the hub assembly until the oil drain plug is at the bottom position (6 o'clock position).
4. Open the oil drain plug and allow oil to drain.
   - ➢ Collect the oil in a suitable container.
   - ➢ Dispose of the oil in an environmentally friendly manner.
5. Clean borehole and oil drain plug.
6. Screw oil drain plug back in.
   - ➢ Tightening torque: **see " Tightening torque for screw plugs" on page 39**



Oil drain, wet multiple disk brake:

1. Place axle in horizontal position.
2. Clean drainage point and oil drain plug.
3. Open the oil drain plug and allow oil to drain.
   - ➢ Collect the oil in a suitable container.
   - ➢ Dispose of the oil in an environmentally friendly manner.
4. Clean borehole and oil drain plug.
5. Screw oil drain plug back in.
   - ➢ Tightening torque: see " Tightening torque for screw plugs" on page 39



Oil drain, differential and carrier assembly / axle housing:

1. Place axle in horizontal position.
   - ➢ The oil drainage point has to be at the bottom.
2. Clean drainage point and oil drain plug.
3. Open the oil drain plug and allow oil to drain.
   - ➢ Collect the oil in a suitable container.
   - ➢ Dispose of the oil in an environmentally friendly manner.
4. Clean borehole and oil drain plug.
5. Screw oil drain plug back in.
   - ➢ Tightening torque: see " Tightening torque for screw plugs" on page 39

9.3.2 Oil filling and filling level

The precise position of the lube point can deviate from the illustration. The relevant lube point can be found on the RICO product on hand.

Recheck the oil level of the RICO product after driving the first time.

The axle has a total oil space.

All oil drain plugs have to be closed before filling with oil.

The whole axle is filled with oil from the hub assembly and differential and carrier assembly / axle housing together.

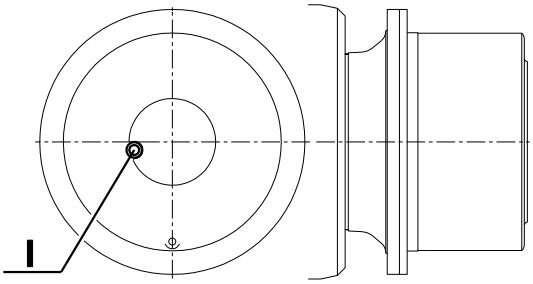
The oil level for the whole axle is specified at the component (differential and carrier assembly / axle housing).

The oil level of the whole axle needs to be checked at the differential and carrier assembly / axle housing.

I = oil filling point

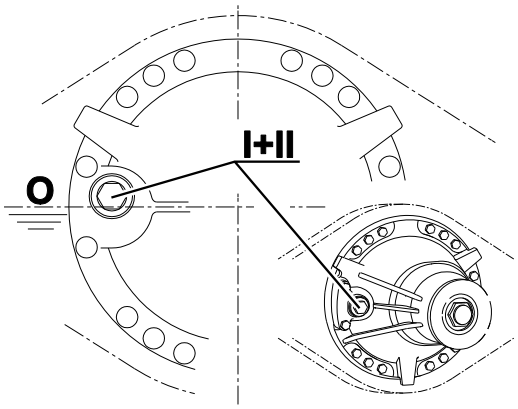
II = oil level inspection point

O = oil level



Oil filling and oil level on hub assembly:

1. Place axle in horizontal position.
2. Clean filling point and screw plug.
3. Turn both hub assemblies into position.
   - ➢ The oil drain plug has to be down.
4. Open the screw plug.
5. Fill both hub assemblies with clean oil until the oil level reaches the filling bore.
   - ➢ Oil in accordance with the specified lubricants. **see "Lubricants and lubrication intervals" on page 16**
6. After a certain time, check the oil level again at the oil level inspection plug for differential and carrier assembly / axle housing.
   - ➢ If necessary, refill oil at both hub assemblies.
7. Clean borehole and oil filling plug.
8. Screw oil filling plug back in.
   - ➢ Tightening torque: **see " Tightening torque for screw plugs" on page 39**



Oil filling and oil level on differential and carrier assembly / axle housing:

1. Place axle in horizontal position.
   - ➢ The oil drainage point has to be at the bottom.
2. Clean filling point and oil filling plug.
3. Open oil filling plug.
4. Fill axle and differential and carrier assembly with clean oil until the oil level reaches the filling bore (= inspection bore).
   - ➢ Overflow check
   - ➢ Oil in accordance with the specified lubricants. **See "Lubricants and lubrication intervals" on page 16.**
5. After a few minutes, check the oil level again at the filling bores.
   - ➢ Keep filling the axle until the oil level remains constant.
6. Clean borehole and oil filling plug.
7. Screw oil filling plug back in.
   - ➢ Tightening torque: **see " Tightening torque for screw plugs" on page 39**

9.4 Checking the screwed connections, safeguards, and formation of corrosion

- **Screws at housing connections, steering assembly parts, and brake parts:** If the screws can be retightened, the Loctite connection breaks. Remounting is necessary then! Secure screwed connections and join connections according to specifications, in case of any doubt, please consult RICO.
- **Corrosion and cracks** on load-bearing components (e.g. axle spindle) are not permissible for reasons of operational reliability and sealing.
  Replace any load-bearing components with cracks!
- **Cracks on steering assembly parts** are not permissible for reasons of operational reliability.
  Replace any steering assembly components with cracks!

9.5 Maintenance intervals

For safety reasons, the vehicle operator has to inspect and service all important screwed connections and safeguards at regular intervals.

Inspection and maintenance-points	Remarks	Maintenance intervals (The value that is reached first is always valid.)				
		after 50 hours of-operation 500 km	after 100 hours of-operation 1000 km	every 500 hours of-operation 5000 km	every 1000 hours of-operation 10000 km	at least 1 x per year
Wheel bearing	Check and readjust		+			+
Wheel nuts	Check and retighten with torque wrench (following a tire change, after about 50 km and about 200 km)	+	+	+		
Nuts / Axle bracket-screws	Check and retighten (check for firm fit)	+	+	+		+
Screwed-connections (e.g. differential and carrier assembly)	Check			+		
Gaskets	Check	monthly				
Screws / Drive flange	Check and retighten (check for firm fit)	+	+	+		+
Wet multiple disk brake	Check the lining wear					+

9.6 Wheel bearing adjustment

⚠ DANGER

Faulty mounting and incorrect securing of the wheel bearing adjustment nut

The wheel along with the complete hub assembly comes off of the axle.

➢ In any case, tighten and secure the wheel bearing adjustment nut as described!

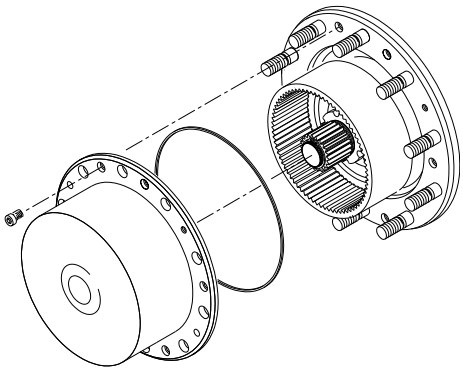
⚠ CAUTION	
	**When loosening the threaded connection, the planetary gear can tip over uncontrolled due to its own weight and fall down.** Danger of being crushed ➢ Secure the planetary gear against falling with suitable lashing gear during disassembly.

The wheel bearing is checked by retightening the wheel bearing adjustment nut.

- ➢ On oil-filled hub assemblies the oil must be drained off.
- ➢ On hub assemblies with drum brake the brake drum must be disassembled/mounted if necessary. See supplier's requirements.
- ➢ On hub assemblies with planetary gears, the planetary gear and, if necessary, the sun gear are disassembled/mounted.
- ➢ On hub assemblies without planetary gears, these steps are omitted. Only the cover is disassembled/mounted.
- ➢ The steps loosening / checking / retightening / securing the wheel bearing adjustment nut always remain the same, regardless of the axle type.

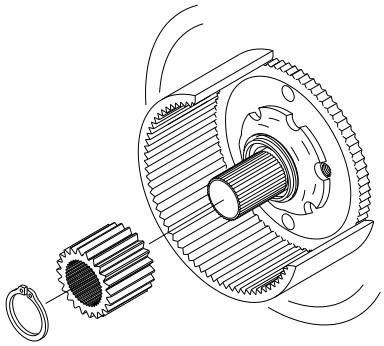
spanner for wheel bearing adjustment nut

order number: 031.209.0-3



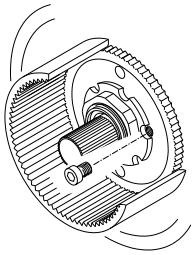
Disassembly of planetary gear:

1. Drain the oil.
   - ➢ See **"Oil change" on page 20.**
2. Loosen and remove mounting screws.
3. Carefully pull off planetary pot/cover.



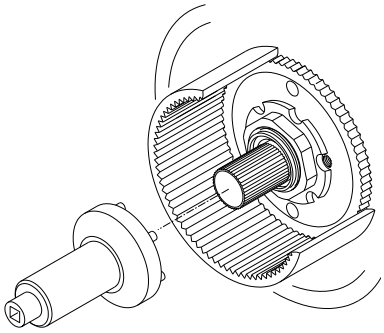
Disassembly of sun gear:

4. Remove circlip.
5. Pull sun gear from the universal joint or the axle shaft.



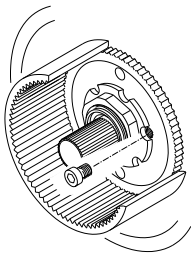
Loosening the wheel bearing adjustment nut:

6. Loosen the securing screw of the wheel bearing adjustment nut, clean it and deposit safely.



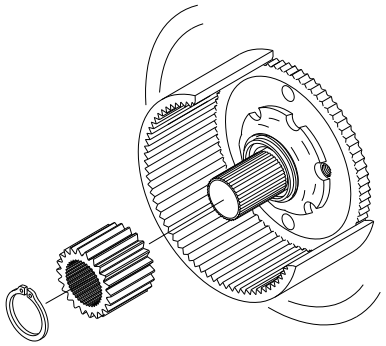
Checking/Retightening the wheel bearing adjustment nut:

7. Put the customer service tool on the wheel bearing adjustment nut and tighten to the specified tightening torque.
   - Customer service tool: Wrench for wheel bearing adjustment nut (see above)
   - Tightening torque for <u>used</u> bearings: 450 Nm
   - Rotate the wheel hub several times while tightening.
   - If it is not possible to secure at this position, the wheel bearing adjustment nut needs to be turned **forward** to the next possible position for securing.



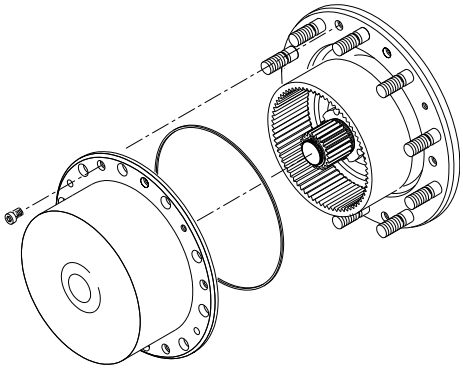
Securing the wheel bearing adjustment nut:

8. Secure the wheel bearing adjustment nut with a screw.
   - Hexagon socket screw
   - Screw securing: Loctite 270
   - Tightening torque: 49 Nm



Assembly of sun gear:

9. Slide sun gear onto the universal joint or the axle shaft.
   - ➢ Bevel of the sun gear is in sliding direction.
10. Mount the circlip.
11. Slide the universal joint or the axle shaft to the inside until circlip contacts the sun gear and the sun gear contacts the thrust ring.



Assembly of planetary gear:

12. Insert O-ring into groove of the planetary housing.
    - ➢ Sealing of the contact surface between planetary housing and wheel hub
    - ➢ Multi-purpose grease prevents the O-ring from falling out during assembly.
13. Align planetary housing so that it aligns with the corresponding boreholes in the wheel hub.
    - ➢ The oil drain plug has to be at the bottom!
14. Slide the prepared planetary unit over the wheel studs.
15. Screw the planetary unit to the wheel hub.
    - ➢ Loctite 262
    - ➢ Tightening torque: See **"Tightening torques for standard metric threads" on page 38.**
16. Top up with oil.
    - ➢ See **"Oil change" on page 20.**

9.7 Wet multiple disk brake regulations

General:

- ➢ Vehicles that are approved for public roads must comply with the ordinances, standards, and regulations of the respective countries. Brake components need to be checked at regular intervals and, if necessary, be repaired or replaced. The regulations of the brake manufacturer must be observed for this.
- ➢ Vehicles that are not authorized need to be inspected by an expert in accordance with the respective accident prevention regulations at least once a year.
- ➢ If there are indications of thermal overload, consult a brake specialist or the manufacturer.

Replacing the brake lining:

- Worn, burned, or glazed lining disks need to be replaced.
- If this is not observed, the general operating license of the vehicle will be void. Any claims for possible damage will not be acknowledged as well.

Running-in instructions for wet multiple disk brakes:

- When starting up the vehicle, drive carefully to bring the brakes to the operational temperature.
- Drive carefully to get used to the brake effect.

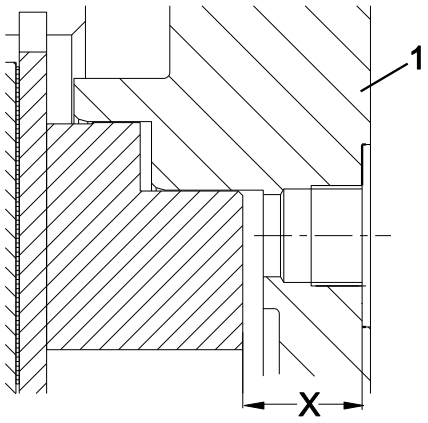
9.8 Lining wear measurement of wet multiple disk brakes

⚠ WARNING	
	**When work is being performed on the brake, its braking effect is disabled.** Rolling away of the vehicle ➢ Make sure that no machine movements can take place.

⚠ CAUTION	
	**Hot brakes and hot cooling oil** Burns ➢ The amount of wear rate may be measured only when the vehicle is cold.

Checking the wear rate by comparing the imprinted value (= measurement with new disks) and the value to be measured (= measurement with used brake).

The reference dimension (= measurement with new disks) is imprinted below the wear inspection hole.



1 Brake carrier

1. Disconnect the supply and return lines of the cooling oil from the brake.
2. Drain the oil from the brake. see "Oil change" on page 20
3. Measure dimension X through the wear inspection hole when the brake is actuated.
   - ➢ **Important:** Measurement needs to be taken from the countersink.
4. Make a note of dimension X.
5. Calculate the difference between the imprinted value with the measured value.
   - ➢ If the difference lies within the permissible tolerance, the brake can continue to be used.
   - ➢ If the difference is greater than the permissible wear rate, consult RICO.
6. Check the cooling oil level in the vehicle.

For Wet multiple disk brake (NLB) 3340, the maximum permissible wear rate is 1.5 mm.

10 Ordering spare parts

10.1 Guarantee

RICO provides a warranty only for the supplied original spare parts.
Please note that use of spare parts that are not original may negatively modify the specified design characteristics of the axle and thus adversely affect the safety.

RICO accepts no liability for damage caused by use of non-original spare parts and accessories. Please note that special manufacturing and supply specifications exist for proprietary and third-party parts and that we always offer spare parts according to the latest statutory standards.

10.2 Required specifications for ordering spare parts

The following specifications are needed for ordering RICO spare parts:

- Part number (no. of the installation drawing)
- Serial number
- Name of the spare part
- Spare part number (drawing or DIN no.)
- Quantity
- Shipping mode

10.4 Necessary consultation with RICO

- If there are any questions, please contact RICO
- In the event of major repairs or overhauls, it would be appropriate to send the entire RICO product to RICO.
- If there are necessary repairs, repair instructions can be requested from RICO.

13 Important information

13.1 Auxiliary materials: Adhesives, sealing compounds, grease, and assembly pastes

13.1.1 Use of auxiliary materials

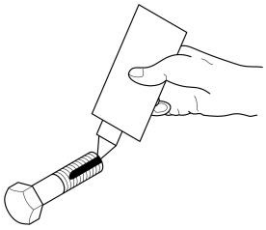
Type	Application	Product	Type	Color
Adhesive	Screw securing light	LOCTITE	243	Blue
Adhesive	Screw securing medium	LOCTITE	262	Red
Adhesive	Screw securing very tight	LOCTITE	270	Green
Adhesive	Friction increase in joint faces	LOCTITE	270	Green
Adhesive	Surface sealing	LOCTITE	510	Orange
Adhesive	Special sealing	LOCTITE	572	White
Adhesive	Sealing with wide gap	LOCTITE	638	Light green
Adhesive	Surface sealing	LOCTITE	5926 or 209 125	Blue
Sealing compound	Elastic sealing	Dirko	Grey	Gray
Assembly paste with MoS_2	Prevents stick-slip	LIQUI MOLY	LM 48	Gray
Multi-purpose grease	Adhesive lubricant	FUCHS	RENOLIT AS	Yellow transparent
Multi-purpose grease lithium soap-based	Bearing lubrication - worked penetration in accordance with NLGI 2	FUCHS	RENOLIT MP150	Yellow transparent

13.1.2 Handling auxiliary materials

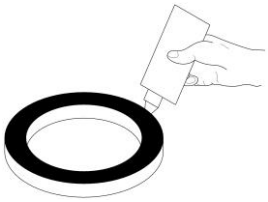
- The surfaces or screws and threaded boreholes to be cemented need to be free of paint, grease, and oil (washed). The Loctite adhesives applied cure under the following conditions:
  - Absence of air
  - Metal contact
  - Warmth
- Only a short time may pass between pre-assembly and controlled tightening (5 - 10 minutes).
- Parts prepared with Loctite intended for cementing can be exposed to air for up to 1 hour.
  Exception: Parts made of nonferrous metal may rest for no more than one minute.
- Allow loaded connections to cure for at least 24 hours.

Loctite amount:

For screws: 1 bead



For joint faces: Ensure sufficient coating!

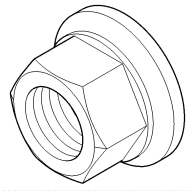


13.2 Tightening torques

Friction: μ = 0.14

The tolerance of the tightening torques is ±5 %
(provided that a manual torque wrench is used).

13.2.1 Tightening torque wheel nut

Wheel nut with flat washer	Size	- Phosphor blackened -
	M 22 x 1.5	650 Nm

13.2.2 Tightening torques for galvanized screws and nuts

Observe the reduced tightening torques for galvanized screws and nuts!

13.2.3 Tightening torques for standard metric threads

Thread size	Screw	Nut	Screw	Nut	Screw	Nut
	8.8	8	10.9	10	12.9	12
M 4	3.0 Nm		4.4 Nm		5.1 Nm	
M 5	5.9 Nm		8.7 Nm		10 Nm	
M 6	10 Nm		15 Nm		18 Nm	
M 8	25 Nm		36 Nm		43 Nm	
M 10	49 Nm		72 Nm		84 Nm	
M 12	85 Nm		125 Nm		145 Nm	
M 14	135 Nm		200 Nm		235 Nm	
M 16	210 Nm		310 Nm		365 Nm	
M 18	300 Nm		430 Nm		500 Nm	
M 20	425 Nm		610 Nm		710 Nm	
M 22	580 Nm		830 Nm		970 Nm	
M 24	730 Nm		1050 Nm		1220 Nm	
M 27	1100 Nm		1550 Nm		1800 Nm	
M 30	1450 Nm		2100 Nm		2450 Nm	

13.2.4 Tightening torques for metric fine threads

Thread size	Screw	Nut	Screw	Nut	Screw	Nut
	8.8	8	10.9	10	12.9	12
M 8 x 1	27 Nm		39 Nm		46 Nm	
M 10 x 1	55 Nm		81 Nm		95 Nm	
M 10 x 1.25	52 Nm		76 Nm		90 Nm	
M 12 x 1.25	93 Nm		135 Nm		160 Nm	
M 12 x 1.5	89 Nm		130 Nm		155 Nm	
M 14 x 1.5	145 Nm		215 Nm		255 Nm	
M 16 x 1.5	225 Nm		330 Nm		390 Nm	
M 18 x 1.5	340 Nm		485 Nm		570 Nm	
M 20 x 1.5	475 Nm		680 Nm		790 Nm	
M 22 x 1.5	650 Nm		920 Nm		1050 Nm	

13.2.5 Tightening torque for screw plugs

Thread size	Tightening torque (reference values for screws with copper ring)	Tightening torque (sealing plug with O-ring)
M 14 x 1.5	approx. 45 Nm (33 lbf x ft)	45 Nm (33 lbf x ft)
M 16 x 1.5	approx. 60 Nm (44 lbf x ft)	--
M 22 x 1.5	approx. 100 Nm (74 lbf x ft)	100 Nm (74 lbf x ft)
M 24 x 1.5	approx. 120 Nm (89 lbf x ft)	--
M 30 x 1.5	approx. 160 Nm (118 lbf x ft)	--
M 42 x 1.5	approx. 260 Nm (192 lbf x ft)	--
M 45 x 1.5	approx. 280 Nm (207 lbf x ft)	--
9/16-18 UN(F)	--	34 Nm (25 lbf x ft)

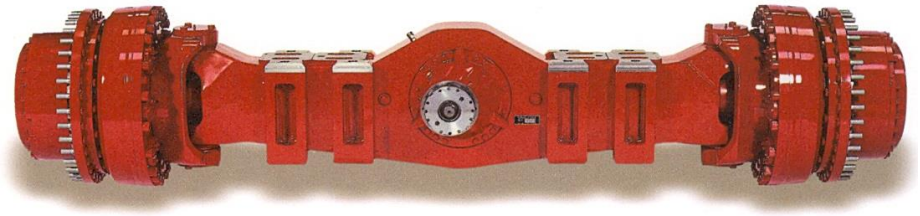
13.3 Units

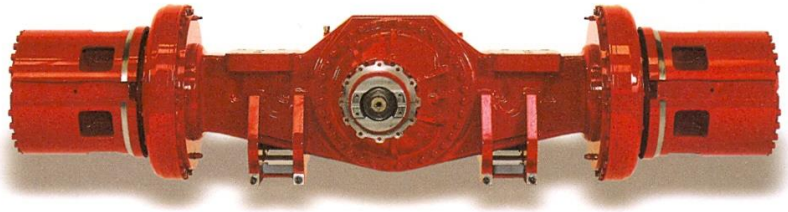
Conversion table

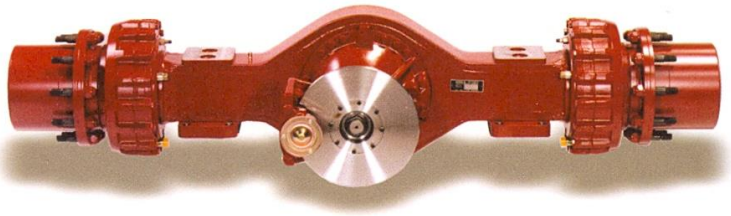
25.40 mm	=	1 in. (inch)
1 mm	=	0.0394 in. (inch)
1 kg (kilogram)	=	2.205 lbs (pounds)
9.81 Nm (1 kpm)	=	7.233 lbf x ft (pound force foot)
1.356 Nm (0.138 kpm)	=	1 lbf x ft (pound force foot)
1 bar (1.02 kp/cm^2)	=	14.5 psi (pound force per square inch lbf/in^2)
0.070 bar (0.071 kp/cm^2)	=	1 psi (lbf/in^2)
1 liter	=	0.264 gallon (imp.)
4.456 liters	=	1 gallon (imp.)
1 liter	=	0.220 gallon (US)
3.785 liters	=	1 gallon (US)
1609.344 m	=	1 mile (land mile)
0°C (Celsius)	=	+32°F (Fahrenheit)
1°C (Celsius)	=	+33,8°F (Fahrenheit)
0°C (Celsius)	=	273.15 Kelvin
1°C (Celsius)	=	274.15 Kelvin

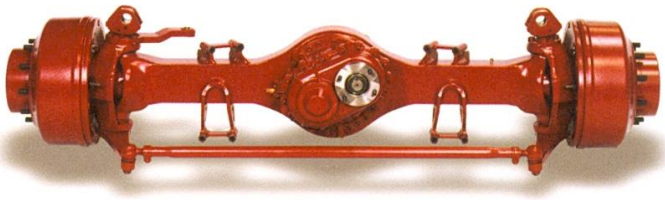
Description of the legal units

Term	Symbol	New	Old	Conversion	Remarks
Moment of torque	T	Nm (Newton meter)	kpm	1 kpm = 9.81 Nm	T (Nm) = F (N) x r (m)
Moment of force	M	Nm (Newton meter)	kpm	1 kpm = 9.81 Nm	M (Nm) = F (N) x r (m)
Pressure	p	bar	atm (gauge)	1.02 atm = 1.02 kp/cm = 1 bar = 750 torr	---









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