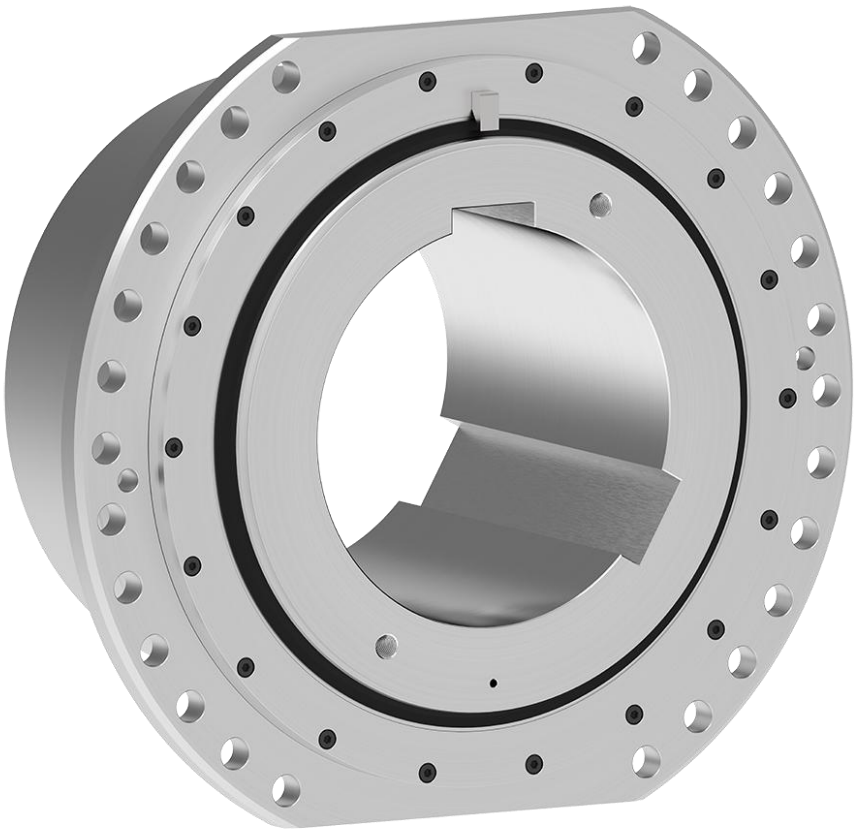
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Assembly and operating instructions
RINGFEDER POWER TRANSMISSION GMBH
Barrel coupling

RINGFEDER® TNK TKVO



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1 Safety instructions

1.1 Occupational safety and environmental protection

The coupling may only be used and operated within the scope of the conditions specified in the service and supply agreement. These assembly and operating instructions are part of the coupling delivery. Keep them accessible near the coupling.



- Read through these instructions carefully before carrying out any assembly or maintenance work.
- RINGFEDER® products may only be assembled or installed by competent personnel and only for suitable application cases.
- No liability claims can be made in the event of noncompliance with the information in these instructions.
- Visibly damaged couplings or their components may not be assembled or put into operation.
- Only use original spare parts.

The relevant occupational safety and environmental protection regulations must be observed during transport, assembly, dismantling and maintenance. Make sure that suitable means of transport are available and are used.



Rotating machine parts can injure operators and service personnel!

Therefore:

- Switch off the drive before starting assembly work.
- Secure the machine against accidental switching on (lock-out).
- Fit all covers, protective devices and guards before switching on the machine.

RINGFEDER POWER TRANSMISSION GMBH (RPT) reserves the right to make changes without notice for the purpose of product improvement.

Our engineering and service employees are available to assist you in case of problems or questions. Contact information can be found on our website www.ringfeder.com.

1.2 Key



Waning!
Always observe!



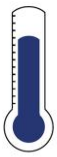
Relevant data of the tightening torques of the respective screws are given in the tables.



Hot surface **warning**



Visual control



Heating / cooling is required for assembly



Clean



Press in lubricant



Recycling / Disposal
Lubricants must be disposed of in an environmentally friendly manner

2 As-delivered condition and storage

2.1 Scope of delivery



On delivery, check that all items listed in the enclosed shipping documents are present. Notify the supplier in writing immediately of any damage and possibly missing parts.

2.2 As-delivered condition

The RINGFEDER® TNK TKVO barrel coupling is supplied as a complete unit, with or without lubricant. Before taken into operation, it must be filled with a suitable lubricant in sufficient quantity, see section 4.6.

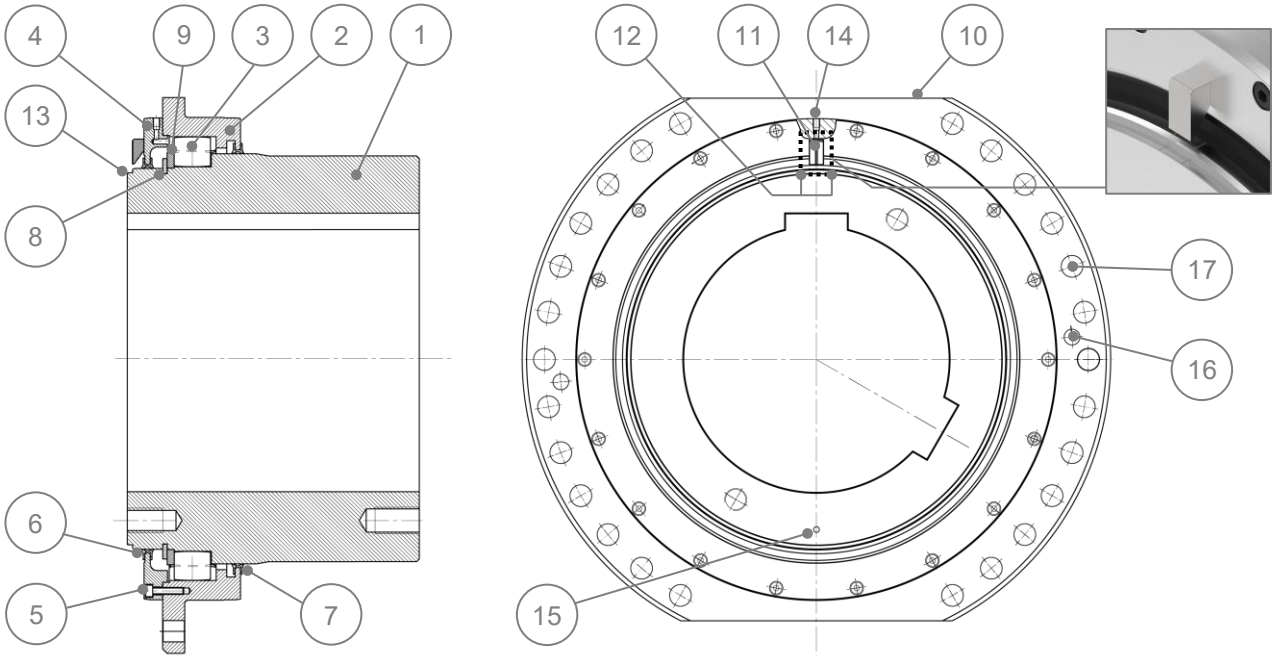
If the coupling is supplied with unfinished bored hub, the wear markings must be set after machining of the hub. If the coupling is delivered with a finish-bored hub, the wear markings are already present on the hub, see section **Fehler! Verweisquelle konnte nicht gefunden werden.**.

2.3 Storage

The room in which the couplings and components are stored must be dry and dust-free. The humidity must not exceed 50%. It must be ensured that condensation does not occur and that there are no acids, caustic chemicals, alkalis, and similar agents near the couplings and all the components.

3 Technical description

The RINGFEDER® barrel coupling TNK TKVO, Fig. 1, transmits the torque by means of barrel-shaped bodies (item 3). These are embedded in semicircular splines half in the hub (item 1) and half in the housing (item 2). This enables the transmission of a radial force while simultaneously compensating for angular misalignment between the elements of the drive train to be connected.



1. hub
2. housing
3. barrel rollers
4. cover
5. cover screws
6. seal (cover)
7. seal (housing)
8. spiral circlip
9. thrust ring
10. driving surfaces
11. pointer
12. wear markings
13. axial alignment marking
14. lubrication hole
15. vent hole
16. forcing-off thread
17. flange screw connection

Fig. 1: Schematic structure of the RINGFEDER® TNK TKVO

The barrel coupling embodies a joint that creates a statically determined system from a statically indeterminate one, thereby compensating for operationally induced deformations and preventing constraining forces, Fig. 2Fig. 2.

Usually, the barrel rollers (item 3) have axial clearance in the coupling so that axial movement between rope drum and gear box is compensated. In such a design, the joint acts as a floating bearing, Fig. 3.

The inner cover integrated in the housing (item 2) allows the hub diameter and thus also the bore diameter to be increased and fixes the barrel roller in the hub axially in the direction of the rope drum. Towards the outside, in the direction of the gear unit, axial fixation is provided by a spiral circlip (item 8), which is also supported by a thrust ring (item 9).

The torque introduced via the gearbox output shaft is transmitted to the housing via the hub and barrel rollers. The housing transmits the torque to the rope drum by means of two driving surfaces (item 10) and the flange screw connection (item 17).

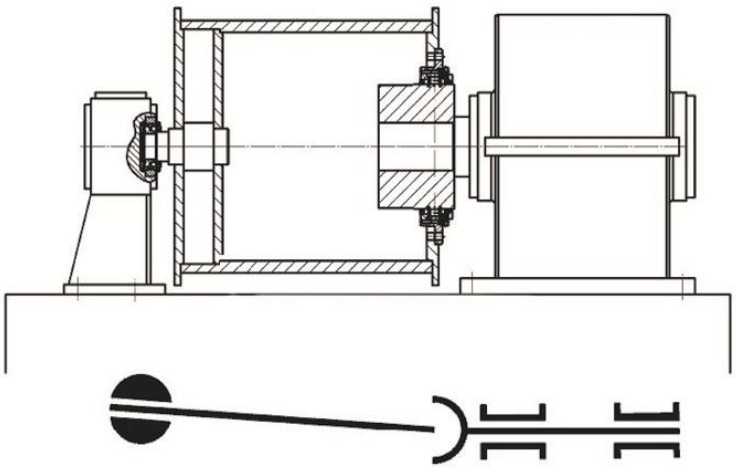


Fig. 2: Representation of a barrel coupling acting as a joint

The two seals (items 6 & 7) prevent the ingress of dirt particles and leakage of lubricant.

A pointer (item 11) attached to the cover allows checking the wear as well as the axial position of the housing to the hub with the help of the inserted markings (items 12 & 13).

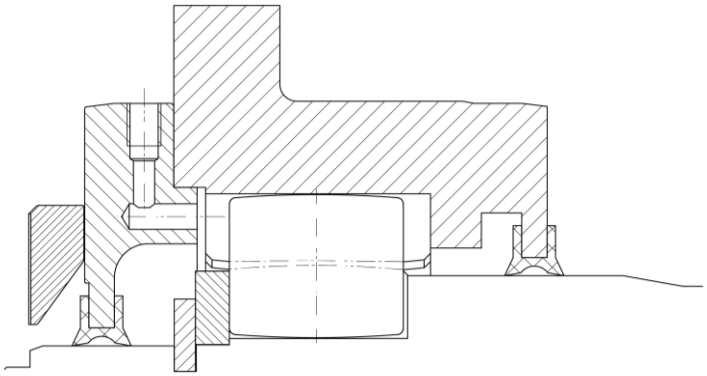


Fig. 3: Floating bearing design of the barrel coupling

4 Coupling assembly

4.1 Coupling characteristics for assembly and operation

Depending on the delivery condition of the coupling – finish-bored or not finish-bored – and the design of its shaft-hub connection, it is necessary to disassemble and reassemble the coupling. Observe the coupling parameters in Table 1. In detail these are:

$s_{ax,max}$	maximum permissible axial displacement during operation
$s_{G,min}$	required mounting dimension between gearbox and cover for inserting the cover screws
s_{Aus}	distance between pointer and hub end face
Δs_{Aus}	permissible deviation of s_{Aus}
Δs_W	permissible deviation between housing and hub end face
G	threaded connection
V_{SM}	lubricant volume
w/2	permissible wear for applications with one load directions

Table 1: Characteristic values of the barrel coupling

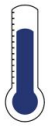
coupling size	$s_{ax,max}$	$s_{G,min}$	s_{Aus}	Δs_{Aus}	Δs_W	G	V_{SM}	w/2
	[mm]	[mm]	[mm]	[mm]	[mm]	[‘‘]	[l]	[mm]
25	+/-3	50	5	+/-0,3	0,4	G1/8	0,1	4
50							0,13	
75		60		+/-0,4			0,16	
100	+/-4						0,19	
130							0,20	6
160							0,23	
200							0,26	
300							0,27	
400		70	9			G1/4	0,39	
500	+/-6		7	+/-0,6			0,75	8
600							0,77	
1000					0,6		0,82	
1500		80					0,88	
2100		90	6				1,57	
2600							1,43	
3400	+/-8		10	+/-0,8			1,69	
4200							2,58	
6200							2,33	

4.2 Shaft-hub connection by feather key, multi-spline profile, or similar

4.2.1 Delivery condition of the coupling: finish-bored



- Clean the surfaces of shaft and hub.



- Heat the complete coupling. The temperature must not exceed 80°C so that all seals remain undamaged. When heating by means of an oil bath, make sure that the oil bath does not contain any components which attack the nitrile-based seals.

- Do not jerk the coupling onto the shaft to the intended position and wait until the coupling has cooled down.

- Check the free, axial displaceability of the housing (item 2).

4.2.2 Delivery condition of the coupling: not finish-bored

In this case it is necessary to disassemble all the coupling parts from the hub. For disassembly and assembly of the coupling, observe the procedure described in the following section.

Please note that if the coupling is delivered with the hub not finish-bored, the wear markings (item 12) must be set after the hub has been bored, Fig. 8 in section **Fehler! Verweisquelle konnte nicht gefunden werden.**.

4.3 Shaft-hub connection by interference fit

4.3.1 Disassembly



- During vertical disassembly and assembly, note that the housing (item 2) may fall after loosening the cover screws (item 5). Use suitable tools to hold the housing in position.

- Loosen the cover screws (item 5) and remove the cover (item 4) with the seal (item 6), Fig. 4 left.

- Remove the spiral circlip (item 8) and then the thrust ring (item 9), Fig. 4 right.

- Remove the barrel rollers (item 3) or – in case of vertical disassembly – let the housing (item 2) slide down carefully and then remove the barrel rollers.

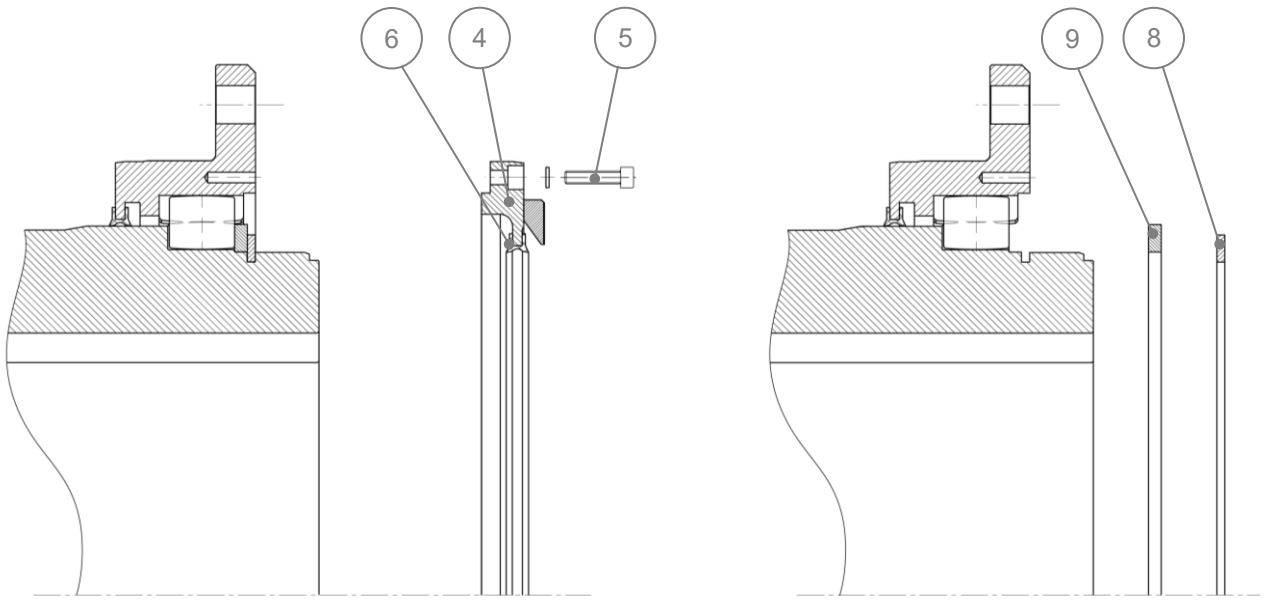
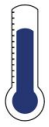


Fig. 4: Disassembly of the coupling

4.3.2 Mounting



- Heat the hub (item 1) to a temperature suitable for assembly. The hub temperature must not exceed 320°C. Ensure uniform heating and avoid local overheating. If the hub is not heated sufficiently to ensure assembly, additional cooling of the shaft on the gear unit side is required.

- Before sliding the heated hub onto the gear shaft, do not forget to position the cover (item 4), the seal (item 6), the spiral circlip (item 8) and the thrust ring (item 9) over the gear shaft and hold them in such a way that there can be no contact with the heated hub when it is pushed on, Fig. 5.

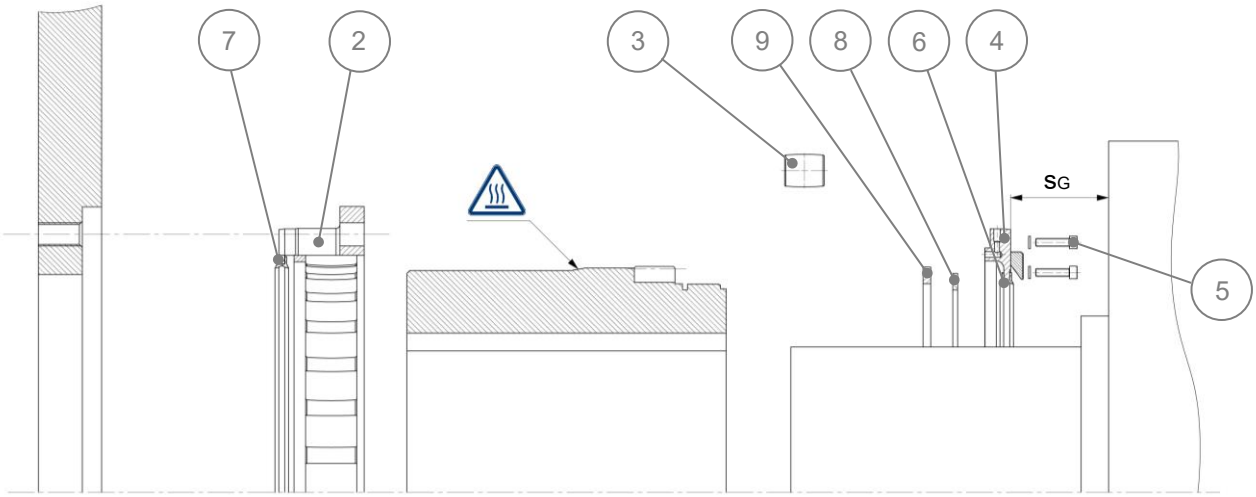


Fig. 5: Mounting the coupling

- Note that once the hub has been placed on the shaft, the mounting space towards the gearbox is usually very limited. Therefore, check the distance s_G **in advance** with the aid of Fig. 5. If the value of s_G is smaller than value $s_{G,min}$ given in Table 1, the necessary mounting space for the cover screws (item 5) is not given. Insert the cover screws before sliding the hub into the cover.

- Do not jerk the heated hub onto the gear shaft to its desired position. Avoid contact between the heated hub and the seal (item 6).

- Before proceeding with the assembly, wait until the hub has cooled down to room temperature.

- When assembling the housing (item 2), make sure that the seal (item 7) remains in position and is not twisted, Fig. 5.

- Place the barrel rollers (item 3) in their recesses and fix them with the thrust ring (item 9) and the assembly of the spiral circlip (item 8), Fig. 5.

- Fix the cover (item 4) with the cover screws (item 5). Make sure that the cover is positioned in circumferential direction to the hub in such a way that the pointer is within the wear markings and the lubrication hole is opposite the vent hole (item 15) if possible. The vent hole should be positioned as far down as possible, Fig. 1.



- First always hand-tighten two opposite cover screws (item 5) and then tighten them in turn to the required tightening torque T_{AS} from Table 2.

- Check the free axial displaceability of the housing as completion of this assembly step.

Table 2: Tightening torques of cover screws (strength class 8.8) and flange screws (min. strength class 10.9)

	M8	M10	M12	M16	M20	M24	M30
cover screws [Nm]	26	51	89	215	420	725	--
flange screws [Nm]	37	75	130	310	620	1060	2100

4.4 Axial alignment of coupling

- The housing (item 2) is connected to the drum flange by means of the flange screw connection (item 17). Screws of at least strength class 10.9 are required for this purpose.

- After the housing and the drum flange have been connected, the coupling must be axially aligned. The alignment of the surfaces of the pointer (item 11) and the offset hub (item 13) with each other serves as an indicator, see Fig. 6.

- Table 1 shows the nominal distance s_{Aus} of the two surfaces to the face of the hub as a function of the coupling size. The permissible deviations Δs_{Aus} for the distance s_{Aus} are also shown in Table 1.

- If the specifications for s_{Aus} are not complied with, suitable measures must be taken, e.g., checking the axial positioning of all bearings.

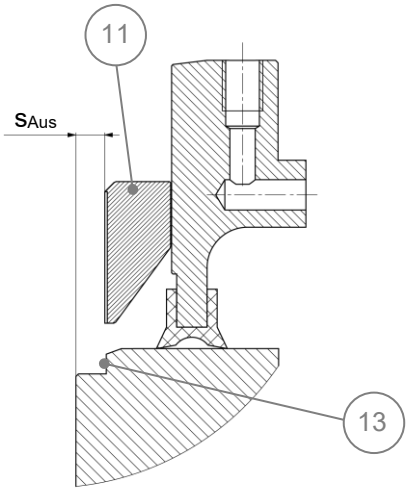


Fig. 6: Axial alignment with the aid of pointer (item 11) and axial alignment markings (item 13)

4.5 Aligning the angular position of the coupling

- Check the angle between the housing (item 2) and the hub face. To do this, measure the distance s_W in the circumferential direction at at least four points, each offset by 90°, Fig. 7. A straight edge or dial gauge can be used as an aid, for example. The maximum difference between the individual measurements must not exceed the values for Δs_W given in Table 1.

- If the values for Δs_W are not complied with, take suitable measures to achieve the needed alignment.

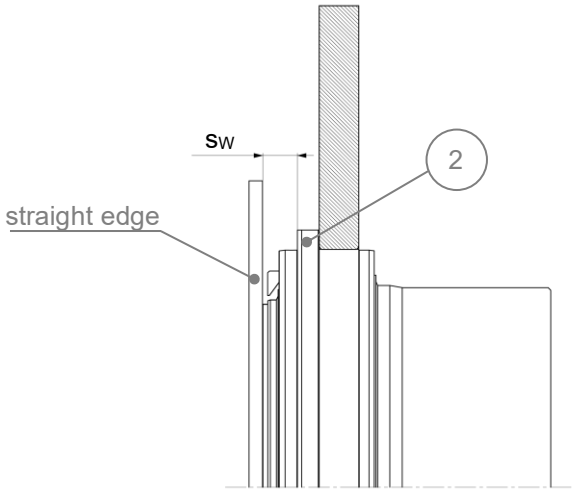


Fig. 7: Checking the angular position

4.6 Lubrication



Before putting the coupling into operation, it must be filled with a suitable lubricant with EP2 additives (*extreme pressure*) of NLGI-2 class. The access to the lubrication hole (item 14) is located radially up to and including size 2600, above size 2600 on the face side of the cover. The threaded connection dimension G can be found in Table 1.



The coupling must be filled with lubricant until it leaks out of the vent hole (item 15). Then turn the coupling by half a turn and pump lubricant into the coupling again until it emerges at the vent hole. Refer to Table 1 for the approximate amount of lubricant V_{SM} required.

Table 3 shows some lubricants which are suitable for use in a temperature range between 20°C and 80°C. If the temperatures are outside this range, consult RPT.

Table 3: Suitable lubricants

supplier	type
Castrol	SPHEEROL EPL 2
Esso	BEACON EP2
Klüber Lubrication	CENTOPLEX 2 EP
Mobil	MOBILUX EP2
Shell	Alvania EP-2
Total	Multis EP 2
Verkol, S.A.	VERKOL EP2

5 Operation, maintenance, and service



During operation and all maintenance activities, observe the safety instructions for occupational health and safety, see chapter 1.

The bearing of the rope drum on the opposite side of the coupling must absorb the axial forces occurring during operation and transfer them into the structure, Fig. 2 right. When bending moments occur, the maximum permissible axial displacement $s_{ax,max}$ of the coupling according to Table 1 must not be exceeded. The values given in Table 1 apply to angularly aligned couplings.

5.1 Lubrication interval



According to the operational mode of the system it is classified into a working group. The lubrication interval depends on this classification, Table 4.



To replace the lubricant, press new lubricant into the coupling via the lubrication hole (item 14). When new grease comes out of the vent hole (item 15), the process is finished. Then turn the coupling half a turn and pump lubricant into the coupling again until it emerges at the vent hole.

Table 4: Lubrication intervals depending on the working groups

working group			lubrication interval	
DIN 15020-1 (1974)	FEM (1970)	FEM 1.001 (1998) BS466 (1984)	operating hours	period
1Bm, 1Am, 2m, 3m	IB, IA, II, III	M1 bis M6	2000	at least once per year
4m, 5m	IV, V	M7, M8	1000	at least twice per year

5.2 Maintenance Interval

Check the following items **at least once a year**:

- The tight fit of all screws with the above-mentioned tightening torques.
- Screws for damage.
- The condition of the driving surfaces (item 10) and their contact with the mating surfaces about damage and uniform contact.
- The **wear of the coupling teeth**: The position of the pointer (item 11) between the wear markings (item 12) on the hub indicates the condition of the tooth flank wear, Fig. 8. In new condition (case I) the wear indicator is in the middle. When the wear limit is reached (case II), the entire coupling must be replaced.

  Table 1 shows the maximum permissible wear values w/2 for applications with only one load direction (typical for crane hoists). For applications with alternating load direction, the distance between the control marks must be halved.

Unless otherwise specified, the finish-bored couplings are shipped with the wear markings (item 12) as shown in Table 1. If the application requires it, we recommend inserting additional wear markings to be able to estimate the wear development correctly.

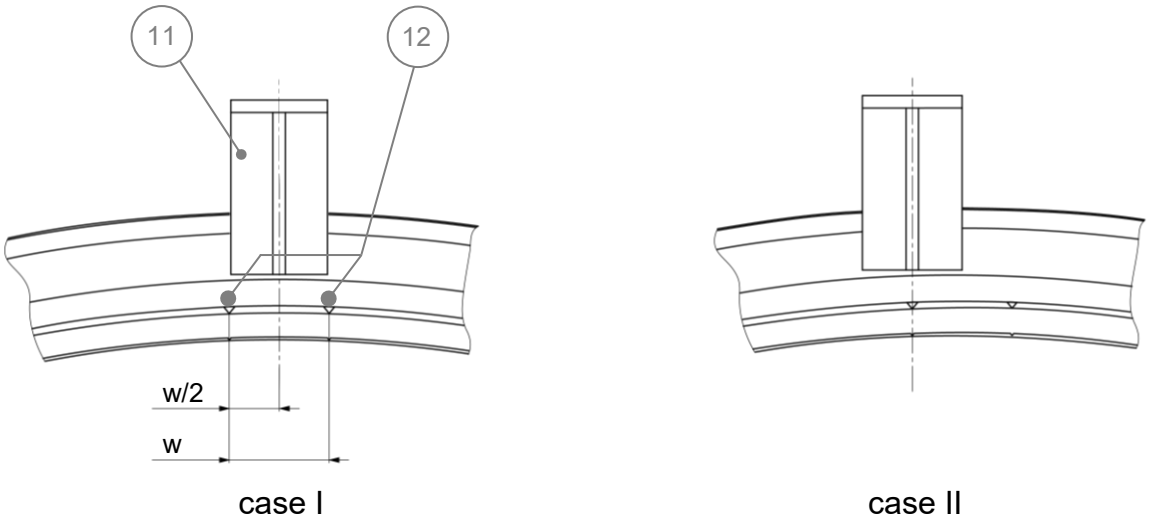


Fig. 8: Wear indicator

- Check **the axial alignment and the angular position**: Check these using the procedure described in sections 4.4 and 4.5. If necessary, correct the alignment of the coupling parts to each other so that the values are again within the specified tolerances from Table 1.

- **Seals** – in case of leakage at the seals (items 6 & 7) or if they are visibly damaged, replacement is mandatory.

6 Disposal



When disposing of coupling parts and lubrication, observe the locally applicable legal regulations.

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