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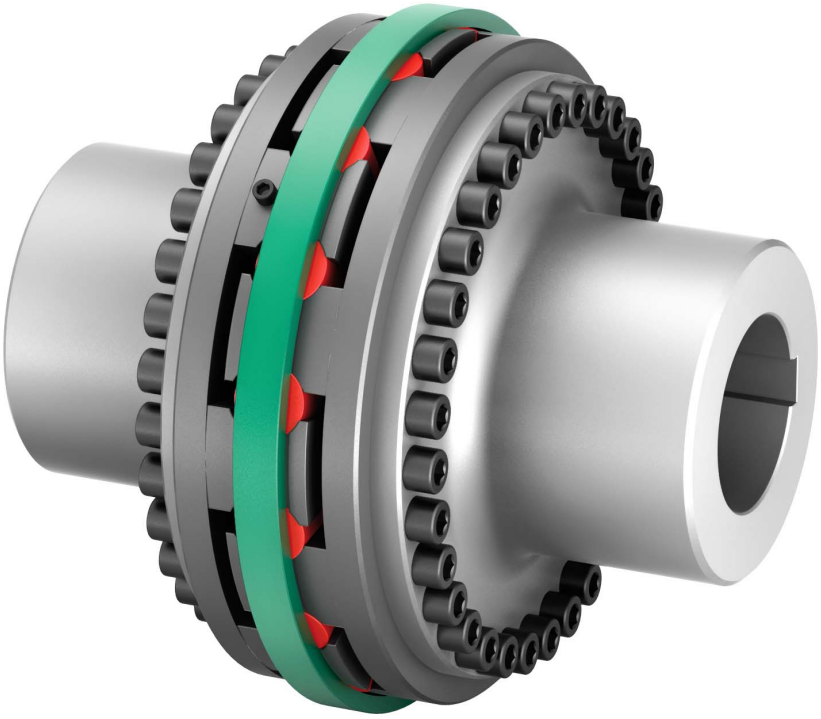
RINGFEDER

Elastomer Jaw Couplings
RINGFEDER® TNB BHDD, TNB BHDDV, TNB BHDDVV

Installation and Operation Manual



TNB BHDD

TNB BHDDV

TNB BHDDVV

Partner for Performance

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Chapter **Page**

1 Safety Instructions

This installation and operation manual (IOM) is an essential component of the coupling delivery. Always keep this manual in a readily accessible place near the coupling.
The German version of this manual is the predominant and binding version.

Make sure that all persons being charged with the installation, operation, maintenance and repair of the coupling read and understand this IOM and that all instructions contained herein are carefully observed in order to:

- Avoid danger to life and limb of the user and third parties.
- Ensure the operational safety of the coupling.
- Preclude operation failures and environmental damage due to wrong handling and misuse.

The relevant instructions and regulations regarding safety at work and environmental protection must be observed while transporting mounting and dismounting the coupling.

The coupling may only be operated, mounted, serviced and maintained by authorised and trained personnel.

The user must take into account that the bolting elements of coupling parts may be adversely affected by the heat produced by a brake disk/ brake drum due to the resultant friction. Make sure that the combination of the employed brake lining with the material of the brake disk/ brake drum does not lead to sparks or impermissible thermal growth. The brake disk is normally made of steel, and the brake drum is normally made of cast iron with nodular graphite. In case of any doubt, please consult the supplier!
In the interest of further development, we reserve the right to carry out modifications serving the technical progress.

We do not assume any liability or warranty for any damage resulting from the use of accessories and parts that are not originally manufactured by RINGFEDER POWER TRANSMISSION.

2 Function

The RINGFEDER® TNB BHDD, TNB BHDDV, TNB BHDDVV- coupling is a torsionally flexible, puncture proof claw coupling. It compensates for angular, radial and axial shaft misalignments within defined limits. The coupling transmits torque through elastic buffers loaded in shear. These buffers come in Perbunan (Pb) or polyurethane (Vk), as a standard VkR.
These elastic buffers dampen shocks and torsional vibrations and are resistant to oil. When the intermediate part is removed (TNB BHDD) respectively when the claw ring is pulled back (TNB BHDDV, TNB BHDDVV) it is easily possible to check the rotational direction of the drive. The coupling is suitable for use in every direction of rotation and installation position.

2.1 Intended application

- The coupling must only be operated in normal industrial atmospheres. Since aggressive media may attack the coupling components, screws and elastic buffer rings, they represent a risk for the operational safety of the coupling. Consult RINGFEDER POWER TRANSMISSION in such cases.
- In order to ensure trouble-free and reliable operation, the coupling has to be sized accord-ing to the design specifications, e.g. according to DIN 740, part 2, (or acc. to Product Paper & Tech Paper “Elastomer Jaw Couplings“), with a service factor appropriate for the service conditions.
- Except for the production of a finish bore with keyway, no further modifications are allowed to be carried out on the coupling!
- The coupling shall only be used and operated within the frame of the conditions as defined in the performance or delivery contract.
- Any change in the operation conditions or service parameters requires the verification of the coupling design.

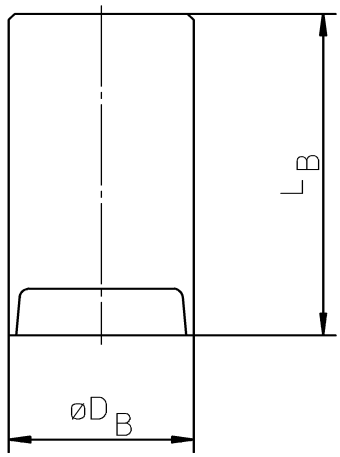
3 Coupling Marking

3.1 Elastic buffers

The elastic buffers are labelled at the front end with:
Coupling size and material code (Vk for Polyurethane or Pb for Perbunan)

Pb82 = Perbunan with a hardness of approx. 82 Shore(A) / black
VkR = Polyurethane with a hardness of approx. 93 Shore(A) / red
VkW = Polyurethane with a hardness of approx. 96 Shore(A) / white

The table contains the size and quantity Z for each coupling:



Size	D_B [mm]	L_B [mm]	Z
240	40	49,5	10
300	50	63	10
350	50	70	12
400	55	79	12
450	55	79	14
500	60	104	14
550	60	104	16
600	60	104	18
650	65	113	18
700	70	139	16
800	70	139	20
900	70	144	24

In case of particularly high balance requirements, the elastic buffers are weight balanced per set.
Do not mix these buffers with those of other couplings and do not replace single buffers of a set.

4 Storage

On receipt of the goods, immediately check that all parts are on hand and are as ordered. Shipping damage and / or missing parts have to be reported in writing.

The coupling parts can be stored as delivered in a dry place under roof at normal ambient temperatures for a period of 6 months. Storage for a longer time requires the application of a long-term preservation (please consult RINGFEDER POWER TRANSMISSION). The elastic intermediate ring must not be exposed to ozonic media, direct sun light or intensive light sources with UV-light. The relative humidity should not exceed 65%. If the parts are properly stored, the quality charac-teristics of the elastic intermediate ring remain almost unchanged for up to three years.

5 Construction

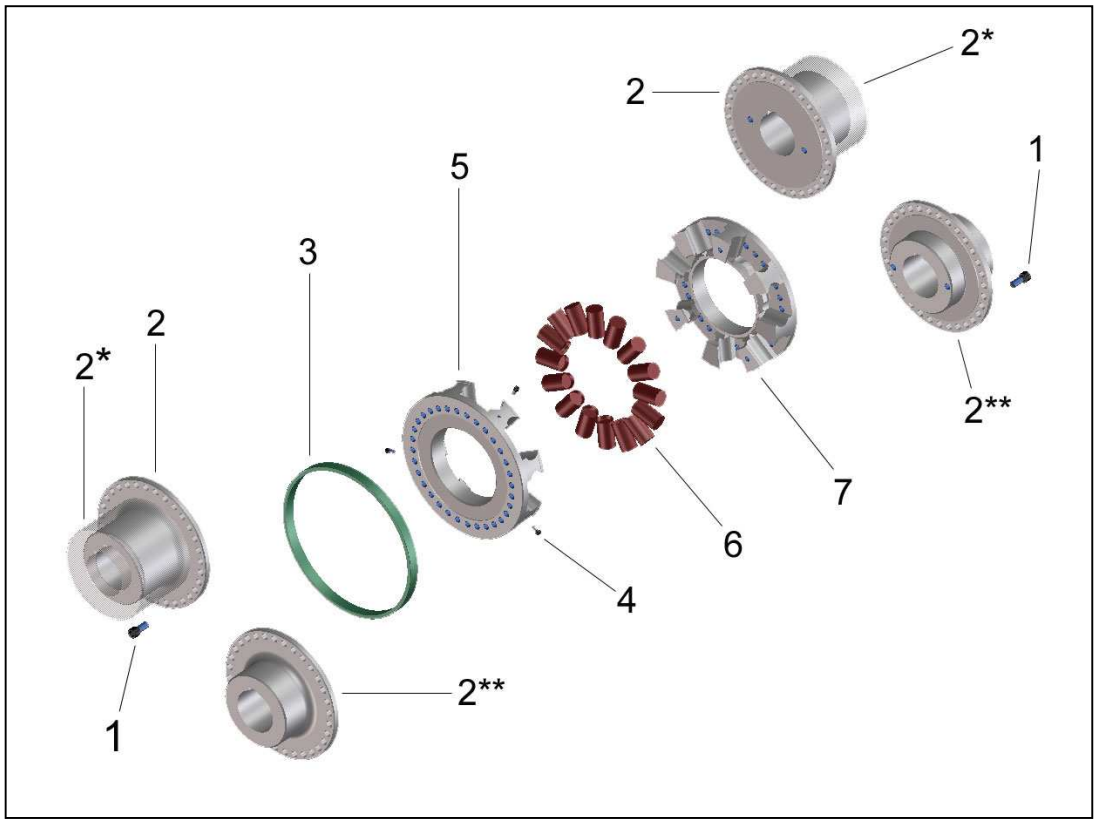


Fig. 1 Construction RINGFEDER® TNB BHDD, TNB BHDDV, TNB BHDDVV

1 Cheese head screws DIN 912
2 Flanged hub BHDD part 411
2* Flanged hub BHDD reinforced part 424
2** Covert flanged hub BHDDV part 423
3 Retaining ring part 408 / GRP
4 Locking screw
5 Claw ring part 434 – with collar for retaining ring
6 Elastic buffers part 043
7 Claw ring part 434

The different cpoupling designs result from the combination of the various hub types:

- BHDD = 2 or 2* with 2 or 2*
- BHDDV = 2 or 2* with 2 **
- BHDDVV = 2** with 2**

Note:
The flange hubs and claw rings are bolted to each other when supplied.
Balanced parts are match marked to each other.

6 Technical Data

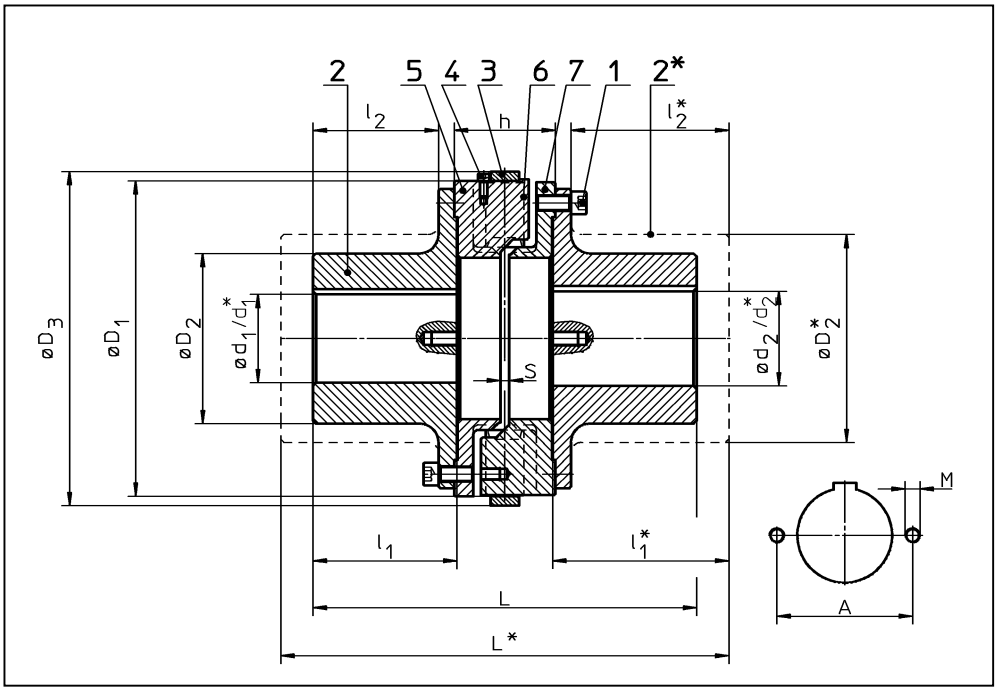


Fig. 2 RINGFEDER® TNB BHDD

Table 1 Technical data RINGFEDER® TNB BHDD

Size BHDD		d_1 / d_2 d_1* / d_2* max [mm]	D_1 [mm]	D_2, D_2* [mm]	D_3 [mm]	h [mm]	L, L* [mm]	l_1, l_1* [mm]	l_2, l_2* [mm]	S [mm]	Puller holes M	Puller holes A [mm]	m [kg]
BHDD	240	85	240	140	260	104	360	130	113	10			58,8
BHDD*		100		150			400	150	133				63,6
BHDD	300	110	300	170	320	124	438	160	139	10			108,6
BHDD*		135		200			490	186	165				124,6
BHDD	350	120	350	180	370	124	478	180	159	10	M16	145	139,3
BHDD*		170		250			580	231	210				188,4
BHDD	400	140	400	210	420	138	512	190	167	10	M20	170	203,4
BHDD*		190		280			610	239	216				262,5
BHDD	450	170	450	250	470	138	532	200	177	10	M20	210	266,0
BHDD*		205		300			610	239	216				316,8
BHDD	500	180	500	270	530	160	608	228	199	14	M24	215	380,1
BHDD*		225		330			710	279	250				457,6
BHDD	550	200	550	280	580	160	608	228	199	14	M24	245	426,8
BHDD*		240		350			710	279	250				519,7
BHDD	600	235	600	330	630	170	678	258	229	14	M24	290	595,8
BHDD		265		385			760	299	270				689,1
BHDD	650	250	650	350	680	182	688	258	225	14	M27	310	689,6
BHDD*		265		385			760	299	261				762,6
BHDD	700	260	700	370	740	200	786	298	263	14	M30	315	912,4
BHDD*		310		450			880	345	310				1076,2
BHDD	800	320	800	450	840	200	866	338	303	14	M30	380	1350,9
BHDD*		340		490			920	365	330				1461,3
BHDD	900	340	900	480	940	214	878	338	297	14	M30	400	1598,4
BHDD*		400		590			1000	399	358				1945,3

Weight m with unbored hubs.

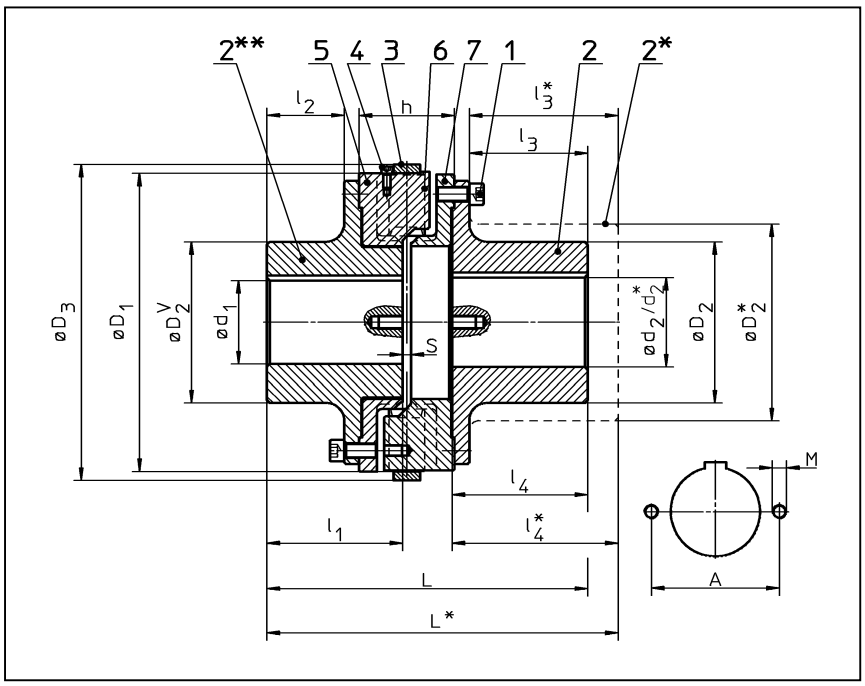


Fig. 3 RINGFEDER® TNB BHDDV

Table 2 Technical data RINGFEDER® TNB BHDDV

Size BHDDV		d_1 max [mm]	d_2, d_2* max [mm]	D_1 [mm]	D_2^V [mm]	D_2, D_2* [mm]	D_3 [mm]	h [mm]	L, L* [mm]	l_1 [mm]	l_2 [mm]	l_3 [mm]	l_4, l_4* [mm]	S [mm]	Puller holes M	A [mm]	m [kg]
BHDDV	240	85	85	240	140	140	260	104	315	130	68	113	130	10			56,4
BHDDV*			100			150			335			133	150				61,1
BHDDV	300	110	110	300	170	170	320	124	384	160	85	139	160	10			105,0
BHDDV*			135			200			410			165	186				121,0
BHDDV	350	120	120	350	180	180	370	124	424	180	105	159	180	10	M16	145	138,1
BHDDV*			170			250			475			210	231				187,2
BHDDV	400	140	140	400	210	210	420	138	451	190	106	167	190	10	M20	170	201,9
BHDDV*			190			280			500			216	239				261,0
BHDDV	450	170	170	450	250	250	470	138	471	200	116	177	200	10	M20	210	264,2
BHDDV*			205			300			510			216	239				315,0
BHDDV	500	180	180	500	270	270	530	160	539	228	130	199	228	14	M24	215	376,1
BHDDV*			225			330			590			250	279				453,6
BHDDV	550	200	200	550	280	280	580	160	539	228	130	199	228	14	M24	245	428,0
BHDDV*			240			350			590			250	279				520,9
BHDDV	600	235	235	600	330	330	630	170	604	258	155	229	258	14	M24	290	595,8
BHDDV*			265			385			645			270	299				689,1
BHDDV	650	250	250	650	350	350	680	182	609	258	146	225	258	14	M27	310	689,6
BHDDV*			265			385			650			261	299				762,6
BHDDV	700	260	260	700	370	370	740	200	698	298	175	263	298	14	M30	315	910,4
BHDDV*			310			450			745			310	345				1074,3
BHDDV	800	320	320	800	450	450	840	200	778	338	215	303	338	14	M30	380	1350,9
BHDDV*			340			490			805			330	365				1461,3
BHDDV	900	340	340	900	480	480	940	214	784	338	203	297	338	14	M30	400	1598,6
BHDDV*			400			590			845			358	399				1945,6

Weight m with unbored hubs.

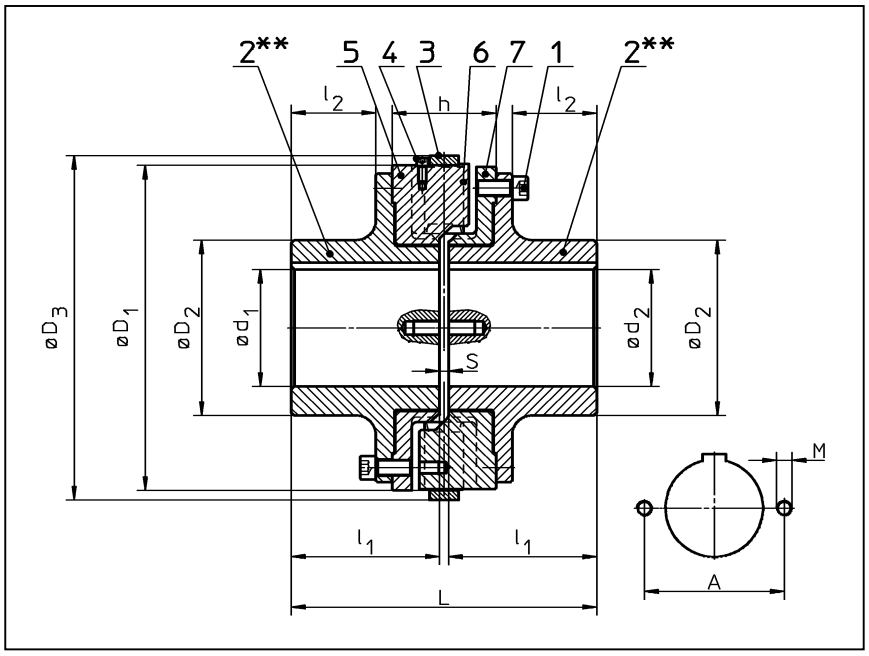


Fig. 4 RINGFEDER® TNB BHDDVV

Table 3 Technical data RINGFEDER® TNB BHDDVV

Size BHDDV	d_1 max [mm]	$d_{2,}$ max [mm]	D_1 [mm]	D_2 [mm]	D_3 [mm]	h [mm]	L [mm]	l_1 [mm]	l_2 [mm]	S [mm]	Puller holes M	Puller holes A [mm]	m [kg]
BHDDVV 240	85	85	240	140	260	104	270	130	68	10			53,9
BHDDVV 300	110	110	300	170	320	124	330	160	85	10			101,4
BHDDVV 350	120	120	350	180	370	124	370	180	105	10	M16	145	136,9
BHDDVV 400	140	140	400	210	420	138	390	190	106	10	M20	170	200,3
BHDDVV 450	170	170	450	250	470	138	410	200	116	10	M20	210	262,3
BHDDVV 500	180	180	500	270	530	160	470	228	130	14	M24	215	372,1
BHDDVV 550	200	200	550	280	580	160	470	228	130	14	M24	245	429,2
BHDDVV 600	235	235	600	330	630	170	530	258	155	14	M24	290	595,8
BHDDVV 650	250	250	650	350	680	182	530	258	146	14	M27	310	689,6
BHDDVV 700	260	260	700	370	740	200	610	298	175	14	M30	315	908,5
BHDDVV 800	320	320	800	450	840	200	690	338	215	14	M30	380	1350,9
BHDDVV 900	340	340	900	480	940	214	690	338	203	14	M30	400	1598,9

Weight m with unbored hubs.

Table 4 Technical data:

Size BHDD..	n_{max} [min^{-1}]	Standard				For couplings with enlarged axial clearance:			
		Pb82		VkR		Pb82		VkR	
		T_{Knom} [Nm]	T_{Kmax} [Nm]	T_{Knom} [Nm]	T_{Kmax} [Nm]	T_{Knom} [Nm]	T_{Kmax} [Nm]	T_{Knom} [Nm]	T_{Kmax} [Nm]
240	4400	1000	3000	2500	7000	900	2700	2170	6500
300	2750	2000	6000	6000	17500	1850	5550	4500	13500
350	2650	3400	10200	10000	31500	3130	9400	7670	23000
400	2100	5050	15200	16000	48000	4630	13900	11330	34000
450	2000	6850	20500	21000	62000	6270	18800	15270	45800
500	2500	10300	30900	28500	85000	9340	28300	23000	69000
550	2350	13200	39600	45000	135000	12100	36300	29500	88500
600	2250	16500	49500	55000	163000				
650	1950	19700	59000	65000	176000				
700	2150	26700	80000	90000	275000				
800	2000	39000	118000	120000	380000				
900	1850	54000	162500	180000	550000				

The torques T_{Knom} and T_{Kmax}. are valid for:

- Ambient temperatures of –30℃ up to +30℃ for Polyu rethane (Vk).
- Ambient temperatures of –30℃ up to +60℃ for Perbu nane (Pb).
- Operation within the range of the specified alignment values.

For determining the size of the coupling according to DIN 740, part 2, (or to Paper & Tech Paper “Elastomer Jaw Couplings“) various factors have to be taken into account:

- the temperature factor $S\upsilon$ in case of higher temperatures,
- the start-up factor Sz depending on the frequency of starts,
- the shock factor S_A, S_L depending on the service conditions.

For circumferential speeds above 22 m/s, referred to the nominal size of the coupling, we recommend balancing the coupling hubs

7 Installation

7.1 To be observed prior to installation:

- **Danger of injuries!**
- **Disconnect the drive before carrying out any work on the coupling!**
- **Secure the drive against unintentional re-start and rotation!**
- **Incorrectly tightened bolts can cause serious personal injuries and property damages!**
- **Assemble the coupling outside of the danger zone. Take care that suitable transportation means are at disposal and that the transportation ways are free of obstacles.**
- **In compliance with accident prevention regulations, you are obliged to protect all freely rotating parts by means of permanently installed guards/ covers against unintentional contact and falling down objects.**
- **As a minimum, the covers have to fulfil the requirements of protection type IP2X.**
- **The covers have to be designed to prevent dust from depositing on the coupling.**
- **The cover must not contact the coupling or impair the proper function of the coupling.**

- Make sure that the speeds, torques and ambient temperatures as stated in chapter 6 ‘Technical Data’ are not exceeded.
- The maximum permissible bore diameters must not be exceeded.
- Check whether the shaft-hub connections safely transmit the occurring operating torques.
- The standard tolerance of RINGFEDER® TNB for finish bores is fit H7.
- Standard keyways comply with DIN 6885, sheet 1.
- Check the dimensions and tolerances of shafts, hub bores, keys and keyways.
- Set screws as required.

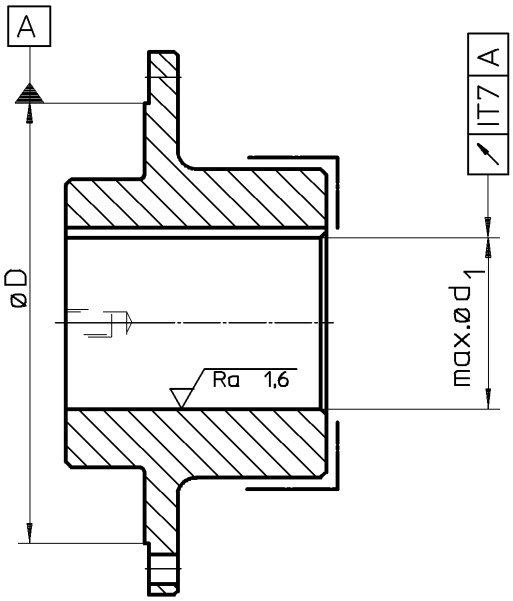
7.2 Finish Bores

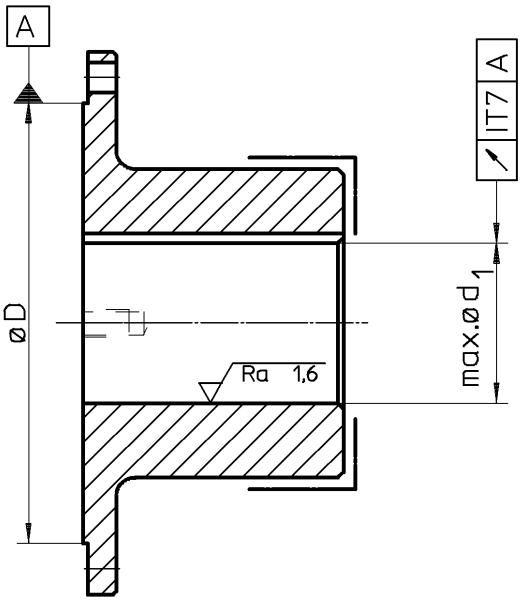
The following procedure has to be observed to produce a finish bore in a coupling hub:

- Clean and remove all preservatives from the coupling hub.
- Mount the coupling hub in between the surfaces marked with ⌈ and carefully align the coupling hub according to the centering diameter øD.
- The values for $ød_{1max}/ød_1{}^*{}_{max}$ and $ød_{2max}/ød_2{}^*{}_{max}$ resp., listed in table 1, 2 and 3 are valid for keyed connections according to DIN 6885/1 and must not be exceeded.
- Select the bore fit so that an interference fit such as H7/m6 results when mating it with the shaft tolerance.
- Axially lock the hub, for example by means of a setscrew on the back of the hub above the keyway.

Consult RINGFEDER POWER TRANSMISSION in case of other shaft-hub connections.

- **The stated maximum bore diameters are valid for keyed connections according to DIN 6885/1 and must not be exceeded.**
- **If these values are exceeded, the coupling can break.**
- **Flying off coupling fragments are a danger to life!!**





7.3 Installing of the coupling

- Remove the locking screws (Fig. 5, Pos. 1) at the retaining ring and put this onto the shaft end (Fig. 5, Pos. 2).
- Take out the elastic buffers (Fig. 5, Pos. 3).
- Prior to installation, carefully clean the bores of the coupling hubs and the shaft ends. The surfaces must be clean, dry and free of grease.
- For larger couplings use suitable mounting tools and hoisting devices such as cranes or pulley blocks.
- Mount the coupling hubs in the proper position on the shaft ends (Fig. 5, Pos.2).
- In case of vertical assembly the hub with the rteaining ring must be positioned upward.

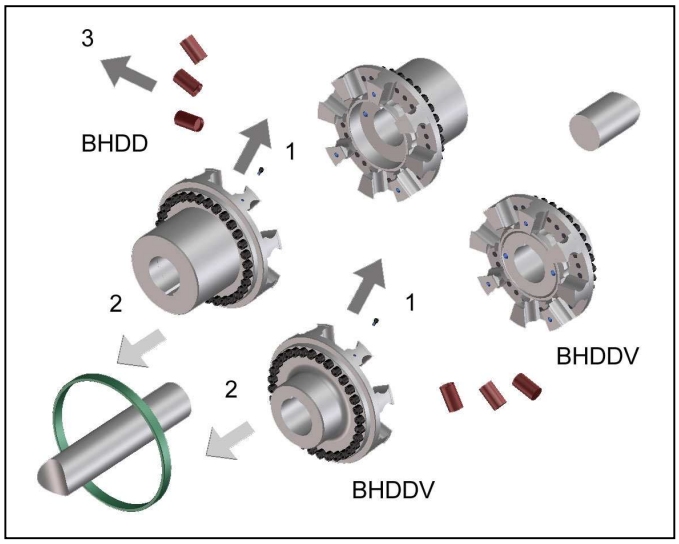


Fig. 5

Note:
To facilitate mounting, the hubs can be uniformly heated to 80℃ to 120℃.

- **Warning!**
- **Always wear heat-resistant gloves to protect yourself against injuries due to hot coupling components!**

- Mount the hubs in such a manner that the shaft end is flush with the inner bore openings (Fig. 6).
  Observe deviant agreements, which may exist.
- When tightening setscrews, secure them with an adhesive, such as e.g. Loctite 222, to prevent the screws from working loose and dropping out

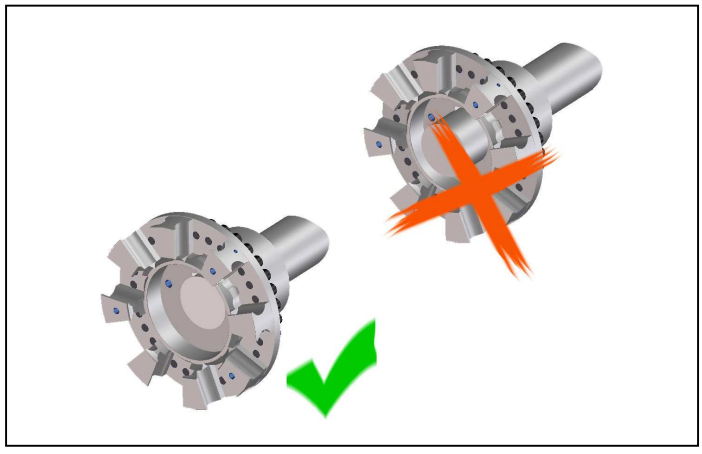


Fig. 6

ATTENTION!
Let the hot hubs cool down to ambient temperature, before inserting the buffers.

- Push together the shaft ends with the mounted coupling halves while observing the mounting dimension ‘h’ acc. to table 8 (Fig. 10).
- To facilitate mounting, the elastic buffers can be coated with a lubricant (for ex. talcum for Perbunan Pb, or commercial roller bearing grease for polyurethane Vk).
- Mount the buffers with the hollow pointing inwards (Fig. 7, Pos. 4).
- Push the retaining ring (Fig. 7, Pos. 2) to the shoulder of the claw ring in such a way that it is centric to the elastic buffers.
- Fix the retaining ring with the locking screws on the claws of the claw ring. Tighten the lo-locking screws (Fig. 7, Pos. 3) with the torque MA as per table.
- Align the coupling in accordance with the in-structions given in chapter 8 ‘Coupling Alignment’.

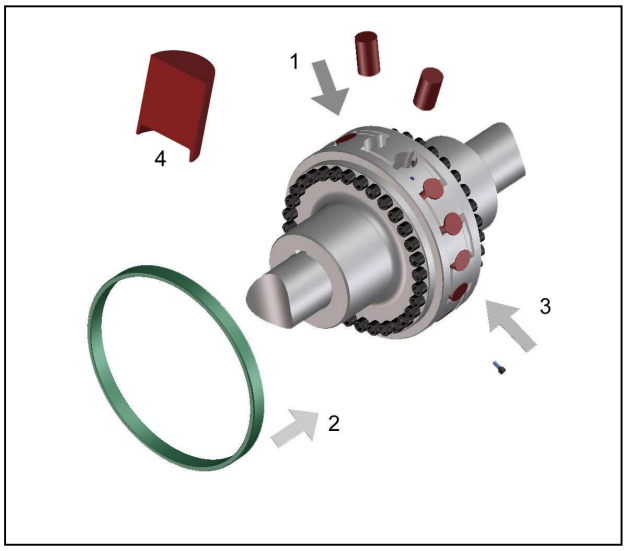


Fig. 7

Table 5 Tightening torque M_A of locking screws:

BHDD.. Size	240	300	350	400	450	500	550	600	650	700	800	900
DIN 912 8.8	M10	M10	M10	M12	M12	M12	M12	M12	M12	M12	M12	M12
M_A [Nm]	49	49	49	86	86	86	86	86	86	86	86	86

8 Coupling Alignment

- **Danger of injuries!**

- **Disconnect the drive before carrying out any work on the coupling.**
- **Secure the drive against unintentional re-start and rotation!**
- **Note:**
- **Accurate alignment of the coupling prolongs the lifetime of the elastic buffers.**
- **It is of utmost importance to observe the recommended alignment values. Exceeding the permissible misalignment values results in coupling damages and failures!**

- When aligning the cold equipment take into account the expected thermal growth of the components, so that the permissible misalignment values for the coupling are not exceeded in operation.
- Be aware that the coupling under misalignment imposes restoring forces on the adjacent shafts and bearings. Take into account that the larger the misalignment, the greater the restoring forces will be
- The maximum permissible misalignment values stated in the tables 6 to 8 are guiding values. It is advisable not to fully utilize these values when aligning the equipment in order to have sufficient reserves for thermal growth, foundation settlings etc. during operation.
- In special applications involving high demands on quiet running characteristics or higher speeds, alignment accuracies of ≤ 0.1 mm may be necessary for the three misalignment levels.
- If the coupling is fitted into a closed housing or guard, so that re-alignment at a later point of time is no longer possible, make sure that the geometry and fitting accuracy of the contact faces ensure precise alignment of the shafts within the stated tolerances during operation.

8.1 Angular misalignment ΔK_w

- Measure one complete rotation (360°) on the face of the outer diameter. Determine the largest deviation Kw1 and the smallest deviation K_{w2} (Fig. 8).
- Calculate the angular misalignment: $\Delta K_w = K_{w1} - K_{w2}$.
- The values according to table 6 are valid for a reference speed of 1500 rpm

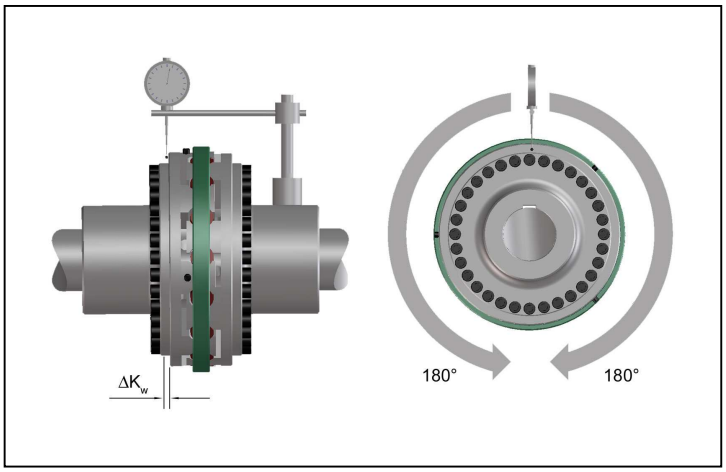


Fig. 8

Table 6 Maximum permissible angular misalignment values:

Size	240	300	350	400	450	500	550	600	650	700	800	900
$\Delta K_{w\,max}$ [mm]	1,0	1,0	1,0	1,0	1	1,0	1,0	1,0	1,25	1,25	1,25	1,25

8.2 Radial misalignment ΔK_r

- Measure one complete revolution (360°). Determine the largest deviation K_{r1} and the smallest deviation K_{r2} (Fig. 9).
- Calculate the radial misalignment $\Delta K_r = 0.5 \times (K_{r1} - K_{r2})$. Observe the preceding sign of the measured values.
- The values according to table 7 are valid for a reference speed of 1500 rpm.

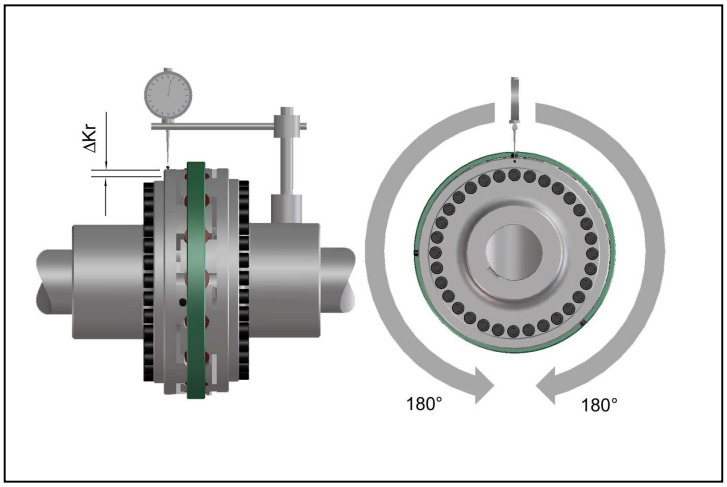


Fig. 9

Table 7 Maximum permissible radial misalignment values:

Größe	240	300	350	400	450	500	550	600	650	700	800	900
$\Delta K_{r\,max}$ [mm]	0,25	0,30	0,35	0,35	0,40	0,50	0,55	0,55	0,55	0,55	0,65	0,70

8.3 Axial misalignment

- Measure the axial flange distance ‘h’ according to fig. 10.
- When aligning observe the flange distance dimension h with the max. permissible tolerance x according to table 8.

In operation, twice the misalignments which may occur due to, e.g., thermal growth are permissible at maximum.

ATTENTION!
If larger axial misalignments are expected in operation, contact RINGFEDER POWER TRANSMISSION.

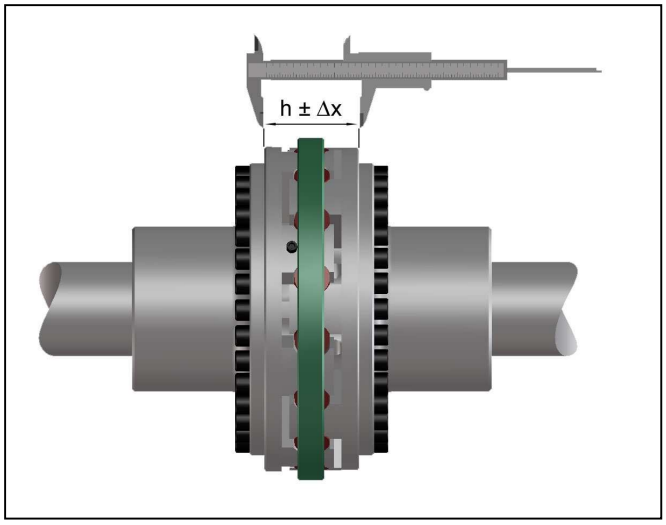


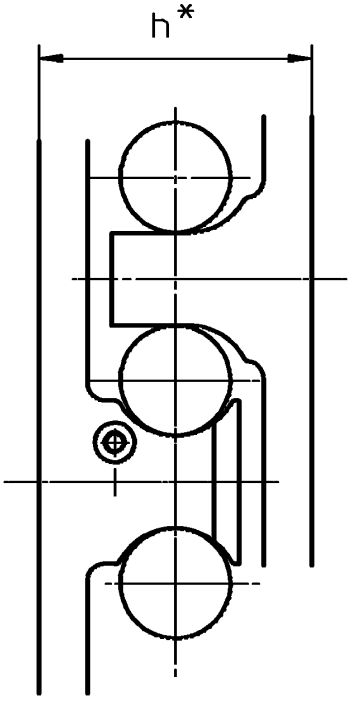
Fig. 10

Table 8 Recommended axial alignment values:

Size	240	300	350	400	450	500	550	600	650	700	800	900
h [mm]	104	124	124	138	138	160	160	170	182	200	200	214
Δx [mm]	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,7	0,7	0,7	0,7

8.4 Couplings with enlarged axial clearance

Couplings with straight claw parts in a claw ring allow larger axial clearances at reduced coupling torques. Set the axial dimension ‘h’ as specified in the order-related documentation and layout drawing! As the elastic buffers are not enclosed by the claw geometry on one side, larger torsion angles result when torque is applied and at displacement of the coupling halves. Make sure to observe the max. permissible buffer wear for this design according to Table 13!



If the coupling is operated at speeds above the reference speed of 1500 rpm, the recommended alignment values stated in the tables have to be reduced accordingly.

Example for coupling size BHDD-500 with an operation speed of 1800 rpm:

Ratio of reference speed/ operation speed = 1500/1800=5/6.

Alignment values for 1500 rpm according to the tables:
ΔK_w = 1.0mm ΔK_r = 0.5mm Δx = 0.5mm

New alignment values for 1800 rpm :
ΔK_w-new = ΔKw x 5/6 = 1.0mm x 5/6 ΔK_w-new = 0.83mm
ΔK_r-new = ΔKr x 5/6 = 0.5mm x 5/6 ΔK_r-new = 0.41mm
Δx-new = ΔX x 5/6 = 0.5mm x 5/6 Δx-new = 0.41mm

9 Operation

When operating the coupling, its specific technical data have to be carefully observed (see chapter 6 'Technical Data'). These values must never be exceeded without the prior written approval by RINGFEDER POWER TRANSMISSION.
In order to ensure trouble-free and reliable performance of the coupling, the coupling has to be designed according to the selection specifications, e.g. according to DIN 740, part 2, (or acc. to Paper & Tech Paper "Elastomer Jaw Couplings"), with a service factor appropriate to the service conditions. Any change in the service conditions or service parameters always necessitates the verification of the coupling design.

- **Danger of injuries!**
- **Disconnect the drive before carrying out any work on the coupling!**
- **Secure the drive against unintentional re-start and rotation!**
- **Improperly tightened screws may cause parts to fly off leading to most serious personal injuries and property damages!**
- **Before putting the coupling into operation, check the alignment and all screwed connections for correct tightening torque and firm fit!**

- **Before starting up the equipment, install all protective guards in order to avoid unintentional contact with freely moving or rotating parts.**
- **The covers have to comply with protection type IP2X as a minimum.**
- **The cover shall be designed to prevent dust from depositing on the coupling parts.**
- **The cover must not touch the coupling and must not impair the proper function of the coupling.**

While operating the coupling, pay attention to:

- Changes in operating noises
- Vibrations
- Lost parts

Attention!

- **Disconnect the drive immediately, if any irregularities are observed while operating the coupling!**
- Identify the cause for the problem using table 9 “Operation Faults and Possible Causes“ and correct the fault.
  The listed problems are some examples to assist you in troubleshooting.
- **All the machinery components and operation modes have to be considered for the determination and correction of faults!**

Table 9 Operation Faults and Possible Causes:

Trouble	Cause	Risk Warning	Correction
Irregular running noises/ vibrations	Alignment fault	Considerable increase of coupling temperature. Premature wear of elastic buffers. Increased reaction forces act on connected machines.	- Disconnect drive - Remove cause for alignment fault - Re-align coupling - Inspect elastic buffers for wear
	Elastic buffers worn out	Coupling claws strike against each other. Spark formation, claw fracture, increased reaction forces..	- Disconnect drive - Check coupling components for damages and replace parts, if necessary - Replace elastic buffers
	Unbalance	Considerable increase in coupling temperature. Premature wear of elastic buffers. Increased reaction forces act on connected machines.	- Disconnect drive - Verify balance state of plant components and correct it, if necessary - Inspect elastic buffers for wear
	Loose screw connections	Flying off parts can cause serious injuries and considerable damages	- Disconnect drive - Check coupling parts for damages, replace parts, if necessary - Verify alignment of coupling - Tighten screws to the specified tightening torque and secure them against working loose, if necessary - Inspect elastic buffers for wear

Trouble	Cause	Risk Warning	Correction
Premature wear of elastic buffers	Alignment fault	Considerable increase in coupling temperature. Increased reaction forces act on connected machines.	- Disconnect drive - Remove cause for alignment fault - Re-align coupling - Inspect elastic buffers for wear
	Unacceptable temperatures	Material properties of elastic buffers change. The torque transmission capability is adversely affected..	- Disconnect drive - Replace elastic buffers - Re-align coupling - Adjust ambient temperature
	Contact with aggressive products	Material properties of elastic buffers change. The torque transmission capability is adversely affected.	- Disconnect drive - Check coupling parts for damages and replace parts, if necessary - Replace elastic buffers - Verify alignment of coupling - Prevent contact with aggressive products
	Torsional vibrations in the drive line	Considerable increase in coupling temperature. Premature wear of elastic buffers. Increased reaction forces act on connected machines.	- Disconnect drive - Analyse and eliminate cause for torsional vibrations - Check coupling parts for damages and replace parts, if necessary - Replace elastic buffers and consult RINGFEDER POWER TRANSMISSION con-cerning eventual use of another Shore-hardness - Verify coupling alignment
Claw breakage	Wear limit of elastic buffers exceeded ===> contact of claws	Coupling is destroyed. Connected machines can be affected, too.	- Disconnect drive - Replace coupling - Inspect the elastic buffers for wear at shorter intervals
	Overload due to too high torque	Coupling is destroyed. Connected machines can be affected, too.	- Disconnect drive - Verify coupling design in cooperation with RINGFEDER POWER TRANSMISSION - Replace coupling - Install larger coupling, if necessary

9.1 Check of Direction of Rotation

- **Danger of Injuries!**
- **Disconnect the drive before carrying out any work on the coupling!**
- **Secure the drive against unintentional re-start and rotation!**
- **Improperly tightened screws may cause parts to fly off what leads to most serious personal injuries and property damages!**

Coupling type TNB BHDD:

- Loosen the screws (Fig. 11, Pos. 1), at the circumference of the retaining ring and push it backward (Fig. 11, Pos. 2).
- Take out the elastic buffers (Fig. 11, Pos. 3).
- Remove the claw rings (part 434) from the centering seat of the flange hubs (part 411 and 424 resp.) (Fig. 11) and push them together.
- Take out the claw rings.
  For larger couplings use appropriate mounting tools and lifting devices such as cranes or pulley blocks.

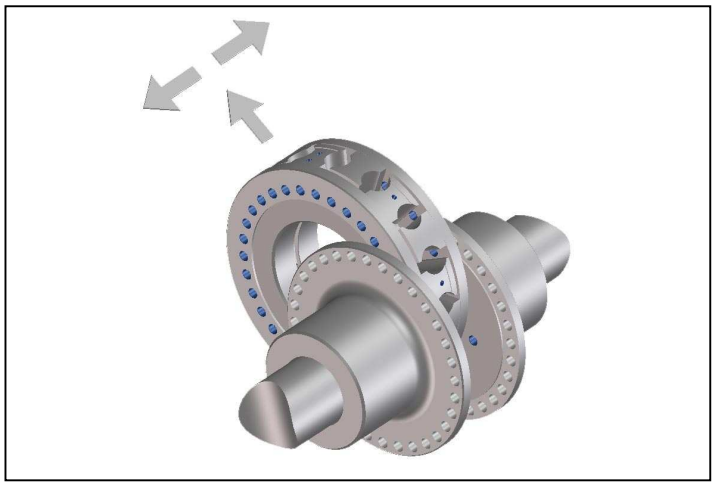


Fig. 11

The coupled machines can now be easily lifted out vertically without having to move them axially.

Coupling Types TNB BHDDV and TNB BHDVV:

- Loosen the screws (Fig. 12, Pos. 1) at the circumference of the retaining ring and push the ring backward (Fig. 12, Pos. 2).
- Take out the elastic buffers (Fig. 12, Pos. 3).
- Remove all the cheese head screws from one coupling half (Fig. 12, Pos. 1). This separates the claw ring from the flange hub.
- Remove the cheese head screws from the other coupling half which are located opposite the front side threads in the claws of the loosened ring (Fig. 12, Pos. 2 and 3).

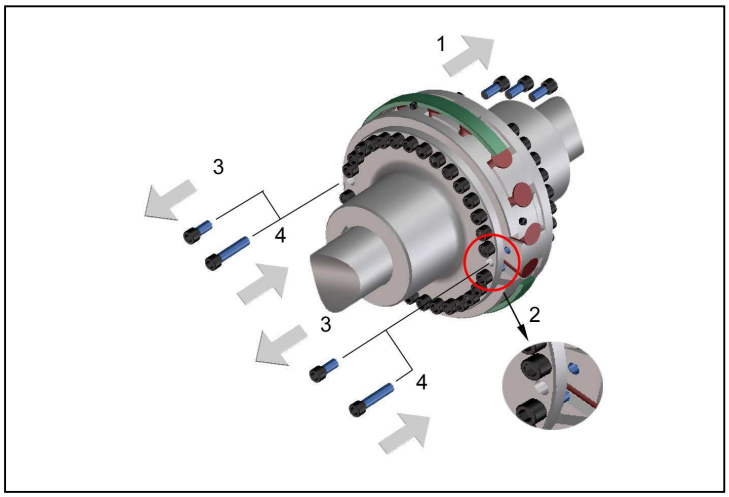


Fig. 12

- Use longer clamp screws (Fig. 12, Pos. 4) to axially remove the loosened claw ring from its centering seat. Make sure there is a gap between the claw ring and the flange hub so that these parts no longer contact each other.

- **BHDDV and BHDDVV:** After having checked the direction of rotation, remove the clamp screws and fasten the claw ring to the flange hub again by using the cheese head bolts.

- **BHDD:** Place the claw rings in the proper positions as marked.

- Make sure that the parts do not get canted at the centering seat while mounting them.
- Make sure that the parts are re-assembled in their original position.

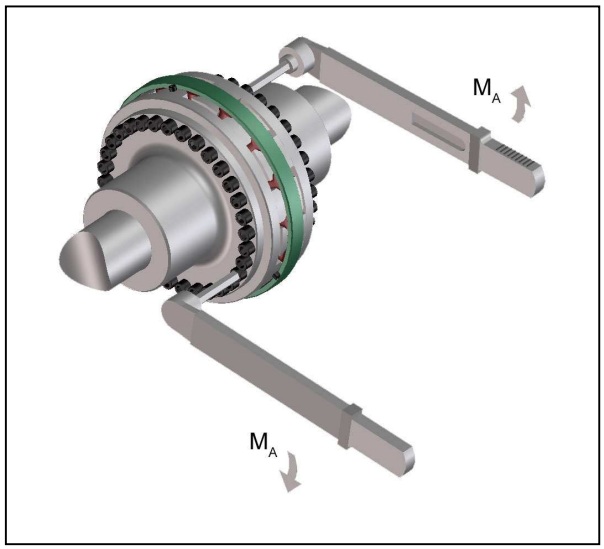


Fig. 13

Attention !
The contact surfaces of the claw rings and flange hubs must be clean, dry and free of grease.
Balanced parts are match-marked to each other.

- Slightly tighten the cheese head bolts in a uniform manner.
- Tighten the bolts with the tightening torque specified in Table 10 (Fig. 13).
- Mount new elastic buffers. To facilitate mounting, the elastic buffers can be coated with a lubricant before installing them (e.g. commercial roller bearing grease for buffers made of Polyurethane Vk, or talcum for Perbunan Pb).
- Check the alignment of the coupling in accordance with the instructions given in chapter 8: ‘Coupling Alignment’.
- Advance the retaining ring (Fig. 7, Pos. 2) up to the contact face at the claw ring, so that the ring is seated centrically above the elastic buffers.
- Use the locking screws to fasten the retaining ring to the claws of one of the claw rings. Tighten the screws (Fig. 7, Pos. 3) with the tightening torque M_A specified in Table 5.

Table 10 Tightening torque M_A for claw ring screws:

Size	240	300	350	400	450	500	550	600	650	700	800	900
DIN 912-10.9	M16	M16	M18	M20	M20	M24	M24	M24	M27	M30	M30	M30
M_A [Nm]	225	225	300	440	440	700	700	700	950	1400	1400	1400

10 Maintenance

The flexible coupling RINGFEDER® TNB BHDD, TNB BHDDV, TNB BHDDVV only requires little maintenance during operation. The elastic buffer ring is subject to wear. The time at which the wear limit of the elastic buffers is reached depends on the service parameters and application conditions

On the occasion of routine inspections or maintenance of the equipment, check:

- Alignment of coupling,

- State of elastomer
- Firm fit of all fastening elements
- Lost parts
- Remove dust deposits from coupling parts and buffers

10.1 Inspection and maintenance intervals

- **Danger of injuries!**
- **Disconnect the drive before carrying out any work on the coupling!**
- **Secure the drive against unintentional re-start and rotation!**

Perform wear checks, inspections and maintenance operations according to the intervals stated in table 11. If excessive wear is already detected on the occasion of the first inspection, check whether the cause for the problem is listed in table 9 “Operation faults and possible causes”. In such a case the inspection intervals must be adapted to the prevailing service conditions. Special operation conditions may necessitate to perform inspections and maintenance operations at shorter intervals than stated.

Table 11 Inspection and Maintenance Intervals

Industry		
1st inspection	after 4 weeks	visual inspection and wear check of elastomer
1st maintenance	after 6 months	visual inspection and wear check of elastomer
2nd maintenance	after 6 months	visual inspection and wear check of elastomer removal of dust deposits from coupling components
each further maintenance	every 12 months	visual inspection and wear check of elastomer removal of dust deposits from coupling components
Mines		
1st inspection	after 4 weeks	visual inspection and wear check of elastomer
1st maintenance	after 6 months	visual inspection and wear check of elastomer
2nd maintenance	after 6 months	visual inspection and wear check of elastomer removal of dust deposits from coupling components
each further maintenance	every 6 months	visual inspection and wear check of elastomer removal of dust deposits from coupling components

On the occasion of maintenance operations on the drive equipment, however, after 3 years at latest:

- Replace the elastic buffers.
- If the wear limit has been reached or exceeded, replace the buffers immediately, irrespective of the inspection intervals of the equipment.
- Check coupling alignment.
- Remove dust deposits from coupling components and buffers

10.2 Wear Inspection on elastic buffers

- If the elastic buffers are considerably deformed or have cracked, the buffers must be replaced.
- Check the wear of the buffers by measuring the minimum diameter of the individual buffers.
- If the coupling has a distinct torsional backlash, or if the minimum buffer thickness (PD_{min} , Fig. 14) according to table 12 is reached, we recommend to replace the elastic buffers.

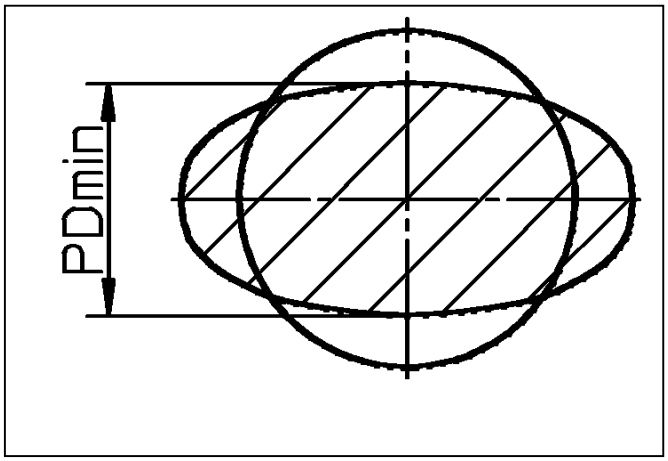


Fig. 14

Table 12 Min. buffer thickness PD_{min}:

Size	240	300	350	400	450	500	550	600	650	700	800	900
PD_{min} [mm]	37	47	47	52	52	57	56	56	61	66	66	66

10.3 Wear inspection of elastic buffers in couplings with enlarged axial clearance

Couplings with straight claw parts in a claw ring allow larger axial clearances at reduced coupling torques (please see 8.4). As the elastic buffers are not enclosed by the claw geometry on one side, larger torsion angles result when torque is applied and at displacement of the coupling halves. Make sure to observe the max. permissible buffer wear for this design according to Table 13!

Table 13 Min. buffer thickness PD_{min} for couplings with enlarged axial clearance:

Size	240	300	350	400	450	500	550	600	650	700	800	900
PD_{min} [mm]	39	49	49	54	54	59	59	59	64	69	69	69

Upon completion of the wear measurement, re-install all the protective devices and covers

10.4 Replacement of elastic buffers

- **Danger of injuries!**
- **Disconnect the drive before carrying out any work on the coupling!**
- **Secure the drive against unintentional re-start and rotation!**

- At first remove the cheese head screws (Fig. 15, pos. 3) and then the retaining ring (Fig. 15, pos. 2).
- Remove the buffers (Fig. 15, pos. 1).
- To facilitate mounting, the new elastic buffers can be coated with a lubricant before installing them (e.g. talcum for Perbunan Pb, or commercial roller bearing grease for Polyurethane Vk)
- Mount new buffers of correct size with the hollow pointing inwards (see Fig. 15, pos. 4).
- Advance the retaining ring (Fig. 15, pos. 2) up to the contact face at the claw ring, so that the ring is seated centrically above the elastic buffers.
- Fasten the retaining ring with the locking screws at the claws of one of the claw rings. Tighten the screws (Fig. 7, pos. 3) with the tightening torque M_A specified in Table 5.
- Align the coupling according to the instructions given in chapter 8 ‘Coupling Alignment’

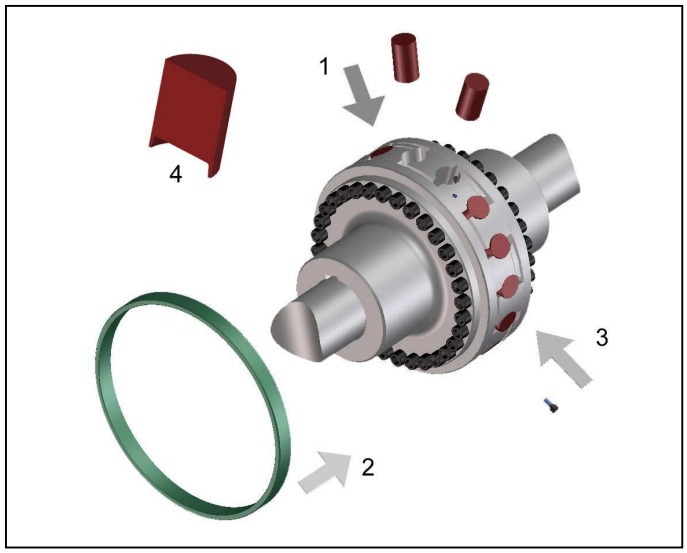


Fig. 15

Warning!

- **Before putting the equipment into service, all safety guards must be installed to prevent unintentional contact with freely rotating parts.**
- **The covers have to fulfil the requirements of protection type IP2X as a minimum.**
- **The covers have to be designed to prevent dust from depositing on the coupling parts.**
- **The cover must not touch the coupling and impair the proper operation of the coupling**

We do not assume any responsibility or warranty for any damages resulting from the use of accessories or spare parts, which have not originally been manufactured by RINGFEDER POWER TRANSMISSION.

11 Disposal

The waste disposal has to occur according to the specific regulations of the respective user country.

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