07.2025

RINGFEDER POWER TRANSMISSION

Installation and operating manual
RLB series

RINGFEDER®

Pin & Bush Coupling

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Contents

1 Legal information 3

2 Liability of the RINGFEDER POWER TRANSMISSION GMBH 3

3 Safety instructions 3

3.1 Key symbols 4

3.2 General danger warnings 5

3.3 EG-Machinery Directive 2006/42/EG 5

4 Transportation, delivery, and storage 7

4.1 Transportation 7

4.2 Delivery 7

4.3 Delivery conditions 7

4.4 Storage 7

5 Technical description 8

5.1 Layout 8

5.2 Intended use of the coupling 9

6 Technical data 10

6.1 Dimensions for couplings without spacer 10

6.2 Dimensions for couplings with spacer 12

6.3 Shaft Alignment 13

7 Assembly 17

7.1 Before installation 17

7.2 Instructions for the pilot bore 17

7.3 Straight bore hub mounting 18

7.4 Taper bore hub mounting 19

8 Start-up and Operation 20

9 Inspection and Periodic Maintenance 21

10 Spare parts 22

11 Malfunctions and their possible causes 23

12 Disposal 24

List of tables

Table 1: Legend for warning symbols 4
Table 2: Basic dimensions without spacer 10
Table 3: Basic dimensions with spacer 12
Table 4: Alignment method 13
Table 5: Maximum permissible misalignment for installation process 15
Table 6: Maximum permissible misalignment for operation process 16
Table 7: Recommended tightening torques (T_A) 18
Table 8: List of quantity used per coupling 22
Table 9: Malfunctions and their possible causes 23

List of figures

Figure 1: RLB up to size 360 8
Figure 2: RLB from size 400 onwards 8
Figure 3: Pilot bore 17
Figure 4: Straight bore 18
Figure 5: Taper bore 19

1 Legal information

This installation and operating manual contains instructions that you must follow for your personal safety and to prevent personal injury and damage to property. The instructions relating to personal safety are marked with a warning; the instructions relating only to damage to property are marked without a warning.

The product or system associated with this accompanying documentation may only be handled by specialist personnel qualified for the respective task, whereby the documentation associated with the respective task, in particular the safety instructions and warnings contained therein, must be observed.

2 Liability of the RINGFEDER POWER TRANSMISSION GMBH

RPT reserves the right to amend these instructions in the course of further developments and new findings.

- The **RINGFEDER®** equipment must be used in accordance with the mode of operation specified in the product catalog or in the customer documentation.
- Correct transportation, storage, assembly, installation, commissioning and operation are prerequisites for the fault-free and safe operation of the products.
- The permissible ambient conditions and the information in the relevant technical documentation must be observed.
- It is the responsibility of the user to ensure that all equipment and/or shafts, where applicable, have been correctly dimensioned.

3 Safety instructions

These instructions describe and provide information on its use in the event of assembly, disassembly or reassembly. Please keep these instructions for future reference. These instructions must be read before using the equipment and must be followed exactly.

3.1 Key symbols

The safety instructions in this manual must be always observed Table 1 summarizes all the symbols that can be used in these instructions.

Table 1: Legend for warning symbols

Warning	Symbol	Warning message
Important note		This symbol indicates that the description contains precise information that must be observed with particular care in order to use the equipment or the machine or system correctly.
Warning of personal injury		This symbol is used to indicate information that could result in bodily injury or serious bodily injury with fatal consequences.
Warning of product damage		This symbol indicates that the description contains important information that must be observed in order to avoid damage to the operator, the equipment, the machine or system.
Warning of suspended load		This symbol is used to indicate instructions that can be used to prevent the risk of injury from loads that are being transported with a crane, for example.
Warning of risk of crushing		This symbol indicates work steps that involve an increased potential risk of crushing; care must be taken to avoid injury.
Warning of risk of hot surface		This symbol indicates that there are surfaces with high temperatures that may be a risk of burns; care should be taken to avoid injury.
Important note about tightening torque		The relevant data on screw tightening torques should be used and are found in the tables. Check the tables to use the correct values.

Heating / cooling is required for assembly		This symbol indicates that assembly and/or disassembly will require a heating or cooling process.
Clean		This symbol indicates that the surface and/or item must be cleaned of any contaminants that could obstruct assembly and/or operation.
Recycling / Disposal		Any item to be recycled or disposed of must be done in an environmentally friendly way.

3.2 General danger warnings

Safe and failure-free operation of the equipment can only be guaranteed if you are familiar with the instructions. Failure to follow the instructions may result in damage to the product, objects and/or people. RPT accepts no liability for damage and malfunctions caused by failure to follow the instructions.

During assembly, disassembly or reassembly, it must be ensured that the entire drive is stationary and protected against unintentional activation. Rotating parts can cause serious injuries. It is therefore essential to read and observe the following instructions:

- All work on and with the equipment must be carried out in accordance with safety regulations.
- In accordance with accident prevention regulations, all freely rotating parts must be protected against accidental contact and falling objects by means of fixed guards.
- If parts are visibly damaged, they must not be installed or put into operation.
- Remember that incorrectly tightened screws can cause serious personal injury and damage to property.
- Only use original RPT spare parts.

3.3 EG-Machinery Directive 2006/42/EG

The equipment supplied by RPT is a component and not machines or partly completed machines within the meaning of the EC-Machinery Directive 2006/42/EC. Accordingly, it is not necessary for RPT to issue a separate declaration of incorporation.

4 Transportation, delivery, and storage

4.1 Transportation

Always use suitable means of transport and lifting equipment for transport in order to avoid injuries caused by falling components or crushing, as well as any kind of damage to people and/or components.

4.2 Delivery

On delivery, check that all items listed in the enclosed shipping documents are present. Damage and any missing parts must be reported to the supplier immediately in writing.

4.3 Delivery conditions

The equipment is supplied as pre-assembled, and the surfaces can be lightly oiled to protect against corrosion.

4.4 Storage

For optimum storage, the packaging should remain as it was when delivered. Under ideal conditions, there is no time limit on the storage period.

- The equipment must not be exposed to aggressive media, extreme temperatures or moisture.
- The equipment must not be stored together with acids, alkalis or other corrosive chemicals.
- The storage location should be dry and dust-free. The humidity should not exceed 65% and no condensation should occur.
- All rubber materials must be stored away from heat-producing equipment and/or heating devices.
- Spare bushes storage shall be in the temperature range of 20-30°C and be free of extraordinary gases, vapors, and chemical contacts, including oils, grease etc.

5 Technical description

The RLB series is a pin and bush coupling designed to transmit torque between the drive shaft and the driven shaft using barrel shaped bushes, which compensate for radial, angular and axial misalignment and reduce the effect of shocks and vibrations.

5.1 Layout

Figure 1: RLB up to size 360

Number	Component	Qty.
1	Hex nuts	acc. to size
2	Spring washers	acc. to size
3	Pin hub	1
4	Bush hub	1
5	Bushes	acc. to size
6	Pins	acc. to size

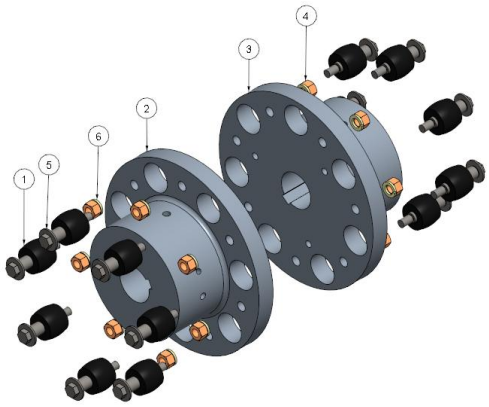


Figure 2: RLB from size 400 onwards

Number	Component	Qty.
1	Bushes	acc. to size
2	Drive hub	1
3	Driven hub	1
4	Hex nuts	acc. to size
5	Pins	acc. to size
6	Spring washer	acc. to size

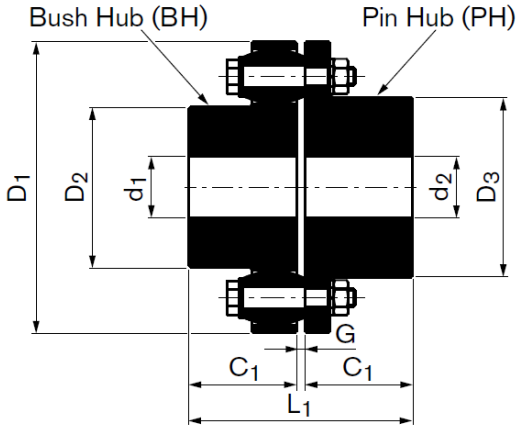
5.2 Intended use of the coupling

The intended use of the coupling is to connect in- and output of a power transmission drive with each other, in most cases these are two shafts. For stationary applications additional equipment like brake drums, torque limiters, etc. can be added to the coupling and will not change the intended use.

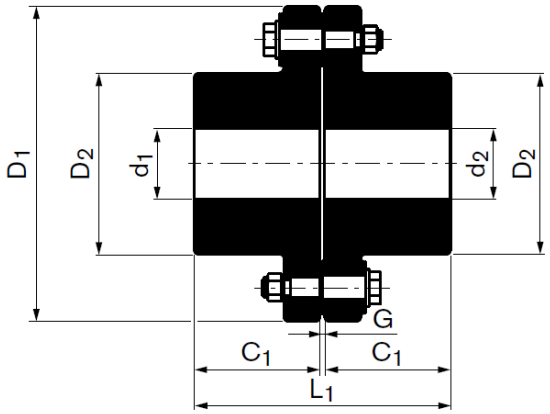
- The coupling may only be used in accordance with the technical data sheet.
- In the case of special couplings, the coupling design takes precedence.
- Unauthorized modifications to the coupling are not admissible. We decline any warranty due to consequent damage.
- For future development of the product, we reserve the right to make technical modifications.

6 Technical data

6.1 Dimensions for couplings without spacer



Up to size 360:
Bush Hub (BH) and Pin Hub (PH)



From size 400:
Alternation of Pins and Buffers

Table 2: Basic dimensions without spacer

Size	Nom. Transmissible torque TKN [Nm]			n_{max} [1/min]	Bore diameter [mm]		
					Min.	Max.	
	RUB	PU	HTR		d_1/d_2	d_1	d_2
105	95	143	239	7200	11	30	32
116	143	215	358	6100	12	39	42
125	162	244	406	5500	14	45	50
144	315	473	788	4900	18	50	60
162	525	788	1313	4500	22	60	65
178	640	960	1600	3800	24	70	75
198	1241	1862	3104	3400	28	80	90
228	2005	3008	5013	3000	28	90	100
252	3056	4584	7639	2700	38	105	115
285	4584	6875	11459	2400	48	115	125
320	6112	9167	15279	2100	55	125	135
360	8881	13321	22202	1900	65	135	150
400	12032	18048	30080	1700	75	160	160
450	18621	27932	46553	1500	85	180	180
500	25783	38675	64458	1350	95	200	200

Size	Nom. Transmissible torque TKN [Nm]			n_{max} [1/min]	Bore diameter [mm]		
					Min.	Max.	
	RUB	PU	HTR		d_1/d_2	d_1	d_2
560	31035	46553	77588	1200	95	225	225
630	42017	63025	105042	1050	100	250	250
710	74962	112443	187405	950	100	260	260
800	99981	149972	249953	850	100	280	280
900	154985	232478	387463	750	100	305	305
1000	194997	292495	487492	680	125	320	320
1120	269959	-	-	600	135	350	350
1250	345016	-	-	550	150	380	380
1400	529986	-	-	490	175	440	440
1600	750002	-	-	430	200	480	480
1800	974983	-	-	380	225	540	540
2000	1300041	-	-	340	250	600	600

For other dimensions, please refer to the technical data sheet available at www.ringfeder.com
For future development of the product, we reserve the right to make technical modifications.

6.2 Dimensions for couplings with spacer

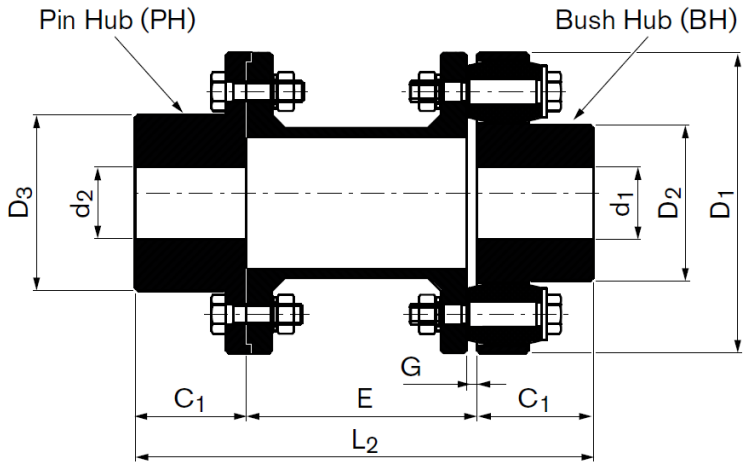


Table 3: Basic dimensions with spacer

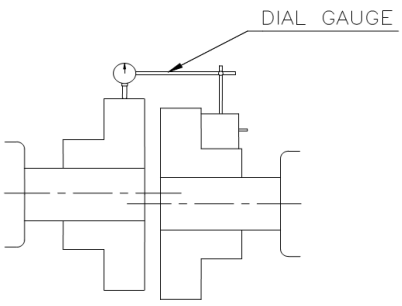
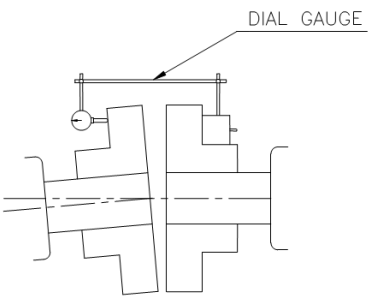
Size	TKN [Nm]	n_{max} [1/min]	Bore diameter [mm]		
			Min.	Max.	
			d_1/d_2	d_1	d_2
105	95.6	7200	11	30	32
116	146.4	6100	12	42	39
144	318.3	4900	18	60	50
162	525.2	4500	22	65	60
198	1247.8	3400	28	90	80
228	2049.9	3000	28	100	90
252	3068.5	2700	38	115	105
285	4551.8	2400	48	125	125
320	6098.8	2100	55	135	135
360	8899.9	1900	65	135	135

For other dimensions, please refer to the technical data sheet available at www.ringfeder.com
For future development of the product, we reserve the right to make technical modifications.

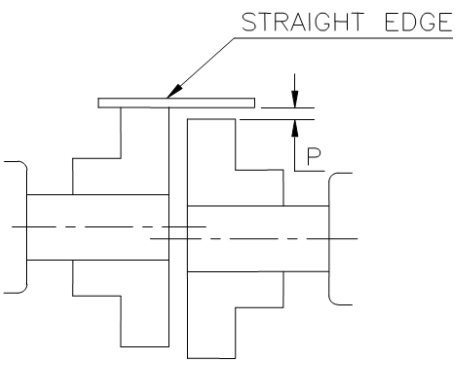
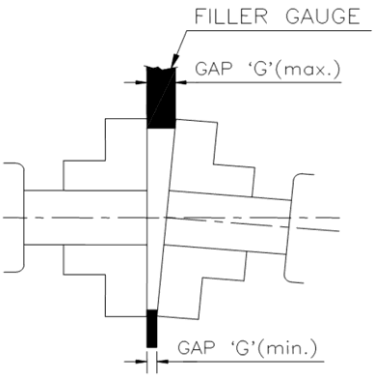
6.3 Shaft Alignment

In order to achieve the optimum service life of the coupling, shafts must be aligned, and the initial misalignment should not be more than 25 % of the maximum misalignment.

Table 4: Alignment method

Method	Parallel/Radial	Angular
1	Using dial gauge 	Using dial gauge 
	Using dial gauge: Fix the dial gauge on one of the hub outer diameter and set plunger on the flange outer diameter of another hub. Rotate the coupling slowly to one complete revolution by taking dial gauge reading at 4 places 90° apart. The parallel misalignment is half the Total Indicated Reading (TIR) shown on dial gauge which is equal to values ‘P’. Check maximum allowed values in Table 5 for installation process and Table 6 for operation process.	

To continue see next page

<table>
<tr><th>Method</th><th>Parallel/Radial</th><th>Angular</th></tr>
<tr><td rowspan="2">2</td><td>Using straight edge
 
</td><td>Using filler gauge
 
</td></tr>
<tr><td colspan="2">Using feeler gauge: Measure gap ‘G’ at 4 places 90° apart without rotating shafts. The difference in maximum and minimum gap will be the Total Indicated Reading (TIR), which will be the angular misalignment present.

The values for the deviation in the standard clearance, i.e. the angular misalignment, must be within the permitted limits.

Check maximum allowed values in Table 5 for installation process and Table 6 for operation process.</td></tr>
</table>

Table 5: Maximum permissible misalignment for installation process

Size	Angular misalignment		Axial [mm]	Parallel / Radial (P) [mm]	GAP (G) [mm]
	Degree [°]	TIR [mm]			
105	0.250	0.458	±0.5	±0.075	2-6
116	0.250	0.506	±0.5	±0.075	2-6
125	0.250	0.546	±0.5	±0.100	2-6
144	0.250	0.629	±0.5	±0.100	2-6
162	0.250	0.707	±0.5	±0.100	2-6
178	0.250	0.777	±0.5	±0.125	2-6
198	0.250	0.864	±0.5	±0.125	2-6
228	0.250	0.995	±0.8	±0.150	4-10
252	0.250	1.100	±0.8	±0.150	4-10
285	0.250	1.244	±0.8	±0.175	4-10
320	0.250	1.397	±0.8	±0.175	4-10
360	0.250	1.571	±1.0	±0.225	4-12
400	0.250	1.789	±1.0	±0.275	4-12
450	0.125	0.982	±1.0	±0.275	4-12
500	0.100	0.873	±1.0	±0.275	4-12
560	0.075	0.733	±0.5	±0.375	4-8
630	0.075	0.825	±0.5	±0.375	4-8
710	0.075	0.930	±0.5	±0.450	5-9
800	0.075	1.047	±0.5	±0.450	5-9
900	0.075	1.178	±0.5	±0.450	5-9
1000	0.025	0.438	±0.5	±0.500	5-10
1120	0.025	0.488	±0.5	±0.550	6-11
1250	0.025	0.545	±0.5	±0.600	6-11
1400	0.025	0.610	±0.5	±0.675	6-12
1600	0.025	0.698	±0.5	±0.750	6-12
1800	0.025	0.785	±0.5	±0.850	8-16
2000	0.025	0.873	±0.5	±0.950	8-16

Table 6: Maximum permissible misalignment for operation process

Size	Angular misalignment		Axial [mm]	Parallel / Radial (P) [mm]	GAP (G) [mm]
	Degree [°]	TIR [mm]			
105	1.0	1.833	±2.0	±0.3	2-6
116	1.0	2.025	±2.0	±0.3	2-6
125	1.0	2.182	±2.0	±0.4	2-6
144	1.0	2.514	±2.0	±0.4	2-6
162	1.0	2.828	±2.0	±0.4	2-6
178	1.0	3.107	±2.0	±0.5	2-6
198	1.0	3.456	±2.0	±0.5	2-6
228	1.0	3.980	±3.0	±0.6	4-10
252	1.0	4.399	±3.0	±0.6	4-10
285	1.0	4.975	±3.0	±0.7	4-10
320	1.0	5.586	±3.0	±0.7	4-10
360	1.0	6.284	±4.0	±0.9	4-12
400	1.0	7.157	±4.0	±1.1	4-12
450	0.5	3.927	±4.0	±1.1	4-12
500	0.4	3.491	±4.0	±1.1	4-12
560	0.3	2.932	±2.0	±1.5	4-8
630	0.3	3.299	±2.0	±1.5	4-8
710	0.3	3.718	±2.0	±1.8	5-9
800	0.3	4.189	±2.0	±1.8	5-9
900	0.3	4.712	±2.0	±1.8	5-9
1000	0.1	1.750	±2.0	±2.0	5-10
1120	0.1	1.950	±2.0	±2.2	6-11
1250	0.1	2.180	±2.0	±2.4	6-11
1400	0.1	2.440	±2.0	±2.7	6-12
1600	0.1	2.790	±2.0	±3.0	6-12
1800	0.1	3.140	±2.0	±3.4	8-16
2000	0.1	3.490	±2.0	±3.8	8-16

7 Assembly

7.1 Before installation

Check the coupling assembly for visible damage. If you find any damage, please contact RPT immediately.

Use suitable transport equipment and lifting devices for installation to prevent injuries caused by falling components or crashes, as well as any type of damage.
Ensure that the system is disconnected from the power supply and other possible energy sources before starting work!

Remove all protective coatings/lubricants from the individual components.

7.2 Instructions for the pilot bore

If the coupling was supplied with a pilot bore, the customer needs to take care with

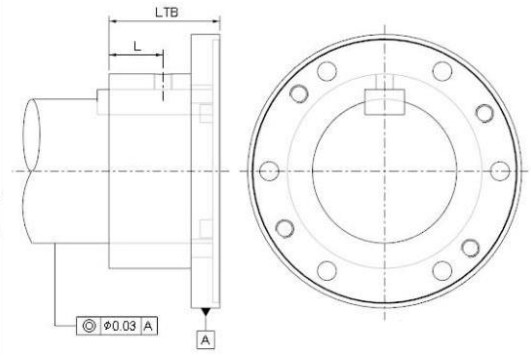


Figure 3: Pilot bore

- The bore must be made in relation to the external diameter of the hub and the finish must be within the H7 tolerance limit.
- The key must be made between two adjacent holes within the JS9 tolerance limit.
- Provide a setscrew at a distance L.

7.3 Straight bore hub mounting

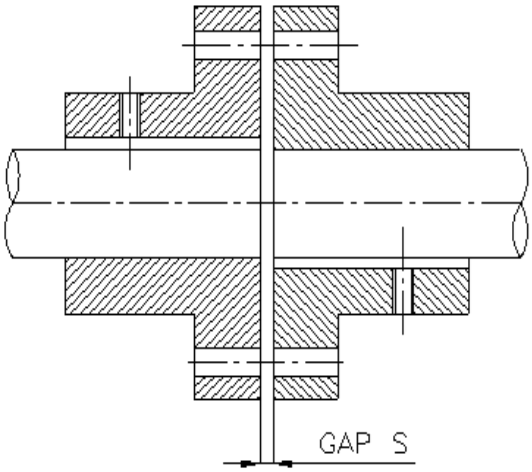


Figure 4: Straight bore

- Mount both hubs on their respective shafts such that the shaft ends are flush with inner face.
- Tighten the set screw over the keys.
- Move the two hubs (together with the equipment) closer together to maintain the clearance ‘S’ (Table 6) between the two ends of the shaft.
- Ensuring that the equipment is aligned properly.
- Insert all pins with their bushings, check the correct position of the pin and bush according to Figure 1 and Figure 2.
- Tighten the nuts evenly to achieve the nominal tightening torque, as shown in Table 7.

For normal applications the shaft ends should be flushed with the inner face of hubs. In some special cases, the shaft ends may protrude beyond the inner face of hubs or may remain inside if required, but the gap ‘S’ (Table 6) should be maintained as specified in drawing or catalogue.

Table 7: Recommended tightening torques (T_A)

Coupling size	Screw size	T_A [Nm]
From 105 to 144	M8	12
From 162 to 198	M10	24
From 228 to 252	M14	66
From 285 to 320	M16	99
From 360 to 500	M20	193
From 560 to 630	M36	1128
From 710 to 1000	M42	1791
For larger sizes, the recommended tightening torque will be indicated in the drawing.		

7.4 Taper bore hub mounting

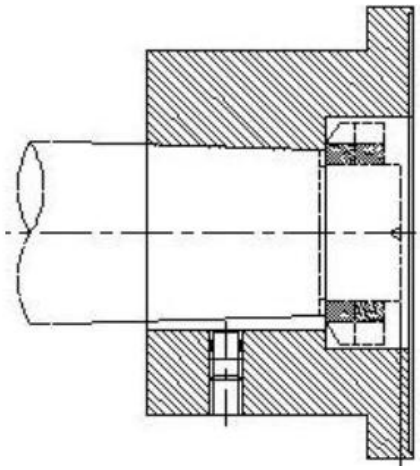


Figure 5: Taper bore

- Slide the hub over the shaft without inserting key up to DBSE as required.
- Mark the hub position onto the shaft or mount the dial indicator by keeping in contact with hub flange.
- Remove the hub and insert key(s) in the shaft.
- Heat the hub in oil bath up to temperature 150° C to make bore bigger than shaft.
- Immediately slide expanded hub over the shaft up to marked position.
- Tighten the set screw over the keys.

- When heating the hub, remember to follow the safety procedures and use appropriate equipment to avoid any type of risk or injury.
- Both in the assembly of the hub with a straight bore and in the assembly with a taper bore, the necessity for shields and/or guards varies with individual installations. The owner or user must provide the required safety guards.
- Safety guards or shields are not furnished by us with this equipment.

8 Start-up and Operation

Before starting up check the pins and bushes for correct seating, i.e. the bushes must sit flush with the end face of the hub, and the set screws for tightness. Check and if necessary, adjust the alignment and the gap dimension.

- Bolt tightening torques for the coupling and tightening torques for the foundation bolts of the coupled machine must be checked before startup. Enclosures (coupling protection, contact guard) must be fitted.!
- Overload conditions during startup cannot be excluded. If the coupling breaks through overload, metal parts may fly off and cause personal injury and/or material damage.
- The coupling must run with little noise and without vibration. Irregular behavior must be treated as a fault requiring immediate remedy.
- If any irregularities are noticed during operation, switch the drive assembly off at once and determine the causes of the fault.
- If the cause cannot be identified or the unit repaired with the facilities available, we recommend that you contact RPT.

9 Inspection and Periodic Maintenance

Under normal operating conditions, the RLB coupling does not require maintenance. Inspect the coupling once in 6 months in idle condition or whenever it is taken for periodic maintenance.

Periodic maintenance of coupling consists of the following check points during normal machinery maintenance schedules.

- Ensure that axial, angular and parallel misalignments are still within the acceptable limits and no major movements have occurred. It is recommended that a record of misalignment readings is maintained.
- For all couplings, ensure that all bolts are tightened correctly.
- Check the rubber bushes by visual inspection for any signs of failure. It is recommended to replace the rubber bushes if signs of wear are observed. Any deep impressions, cracks or swelling are also required to be checked.

The following operating conditions can affect the life of rubber bushes, so we request the customer to check the following,

- Numbers of starts & stops
- Working environment (either in an open environment or in plant)
- Load variation
- Misalignments

Any requirement for spare parts should be made quoting the original purchaser, original purchase order number and the coupling drawing number.

10 Spare parts

We recommend storing spare items as given below, to have continuous operation and to reduce down time due to failures.

Component	Quantity
Pins	1 set acc. to size
Bushings	1 set acc. to size

Table 8: List of quantity used per coupling

Size	Number of pins and bushings	Pins part number	Bushing part number
105	3	RB/P-2	RB/B-2
116	4	RB/P-2	RB/B-2
125	4	RB/P-2	RB/B-2
144	6	RB/P-2	RB/B-2
162	6	RB/P-3	RB/B-3
178	6	RB/P-3	RB/B-3
198	10	RB/P-3	RB/B-3
228	11	RB/P-4	RB/B-4
252	12	RB/P-4	RB/B-4
285	11	RB/P-5	RB/B-5
320	12	RB/P-5	RB/B-5
360	11	RB/P-6	RB/B-6
400	10	RB/P-7	RB/B-7
450	12	RB/P-7	RB/B-7
500	14	RB/P-7	RB/B-7
560	10	RB/P-8	RB/B-8
630	12	RB/P-8	RB/B-8
710	12	RB/P-9	RB/B-9
800	14	RB/P-9	RB/B-9
900	16	RB/P-9	RB/B-9
1000	18	RB/P-9	RB/B-9

11 Malfunctions and their possible causes

Table 9: Malfunctions and their possible causes

No.	FAILURE MODE	PROBABLE CAUSES	CORRECTIVE ACTIONS
1	Worn out bushes. Premature shaft bearing failure.	Excessive shaft misalignments.	- Replace bushes and realign the coupling.
2	Fatigue of Bushes Overheated Bushes	Torsional vibration Excessive starts and stops High peak load	- Perform torsional analysis. - Redo coupling selection.
3	Swollen or cracked Bushes	Chemical attack	- Use more chemically resistant bushes (*).
4	Distorted or deteriorated bushes.	Excessive heat.	- Use more heat-resistant bushes (*).
5	Shattered bushes.	Low temperature.	- Use special low temperature bushes (*).
6	Loose hubs on shaft with sheared keys.	Torsional shock overload	- Check sizing and service factors of coupling.
7	Severe hub corrosion	Chemical attack	- Coat hub with anticorrosive coating (*)

(*) Consultation with RPT is required.

12 Disposal

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

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