

Operating Instructions

# **WHEEL SET KG 125 SERIES**

**RA/RN  
400/500**



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## Description

Karl Georg maintenance-free wheel sets take over rail-born transport tasks in crane building, in conveyor technique and in machine building.

The assembly variant RA / RN is suitable for installation in steel constructions, the holding fixture boreholes in the carriage girder can be flame-cut or spindled out.

The drive shafts are available with tooth profile according to DIN 5480 or with feather keyway according to DIN 6885, suitable for hollow shaft gearboxes of your choice.

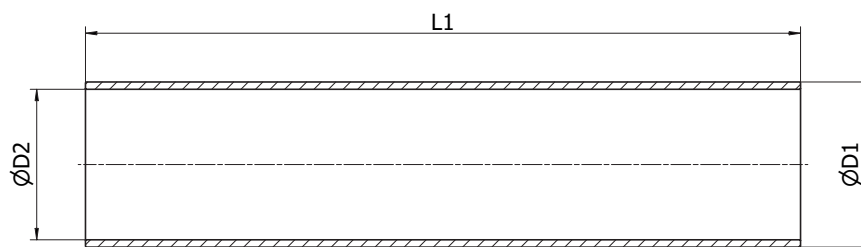
The middle track width can be corrected by  $\pm 6$  mm for wheel set RA/RN 400 and  $\pm 7$  mm for wheel set RA/RN 500 by replaceable compensating discs between roller bearing and circlip. Delivery of the wheel sets RA/RN is effected in component parts.

### ATTENTION:

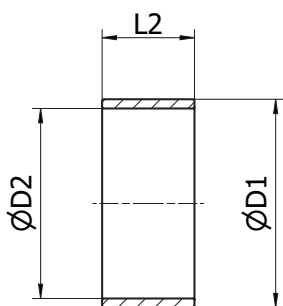
An assembly set is required for assembly and disassembly. Delivery of the wheel set RA / RN 400 / 500 does not include these instruments (see instructions page 6).

### The assembly set consists of:

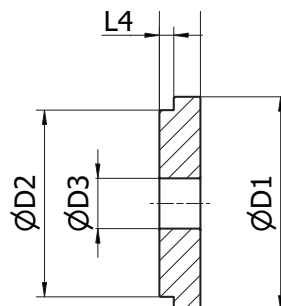
- 1 Assembly tube long for RA (40)
- 1 Assembly tube short for RN (40)
- 1 Hexagon head screw DIN 933 (41)<sup>1</sup>
- 1 Hexagon head nut DIN 934 (42)<sup>1</sup>
- 1 Disc (43)



Assembly tube long for RA



Assembly tube short for RN

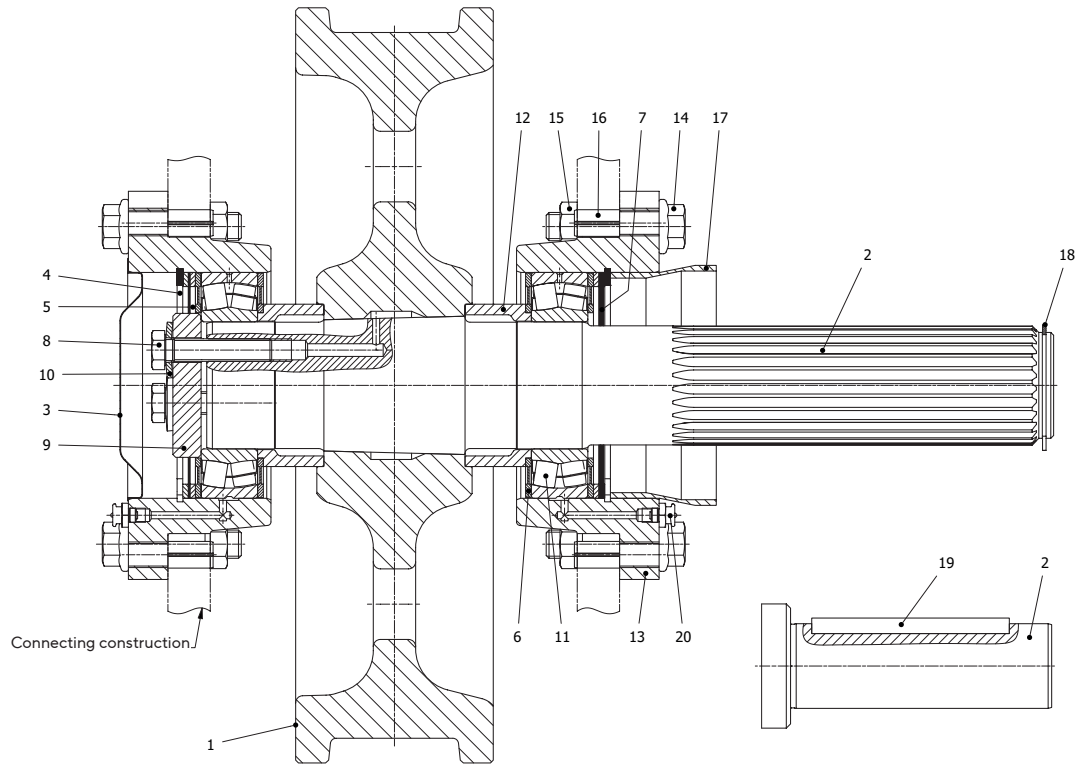


Disc

	L1	L2	L3	L4	Ø D1	Ø D2	Ø D3
RA/RN 400/500	330	40	15	5	88.9	79.9	26
RA/RN 400/500	440	45	20	7	101.6	92.6	26

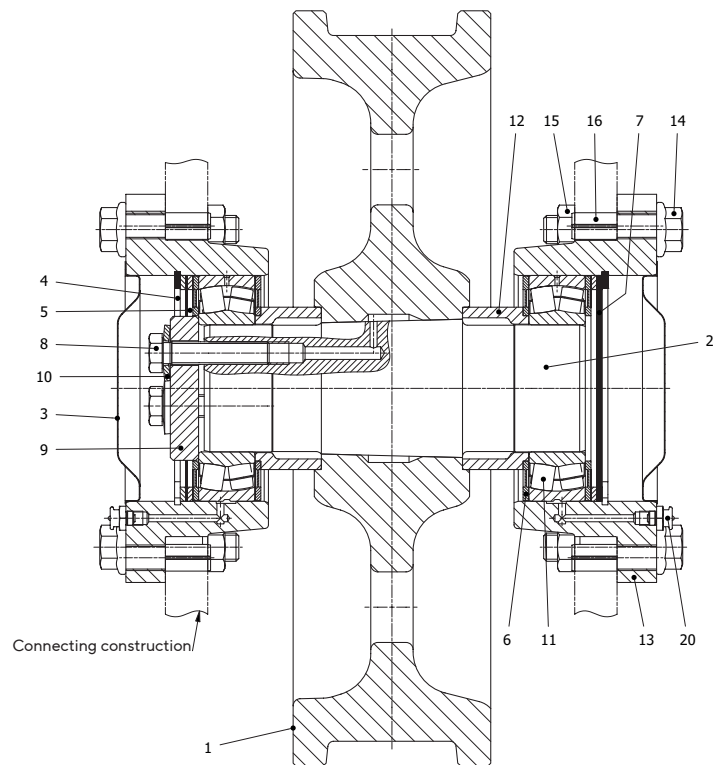
<sup>1)</sup> for further information see parts lists

## Technical construction RA 160/250



- |                                    |                                 |
|------------------------------------|---------------------------------|
| 1 Crane wheel                      | 11 Self-aligning roller bearing |
| 2 Drive shaft                      | 12 Spacer                       |
| 3 Cover, without borehole          | 13 Flanged bearing housing      |
| 4 Circlip                          | 14 Locking screw                |
| 5 Compensating disc, 4 mm thick    | 15 Retained nut                 |
| 6 Sealing ring                     | 16 Clamping sleeve              |
| 7 Compensating disc, 1 mm thick 16 | 17 Protective bellow            |
| 8 Hexagon head screw               | 18 Circlip                      |
| 9 Tightening disc 18 Circlip       | 19 Feather key                  |
| 10 Disc spring                     | 20 Flat lubricating nipple      |

## Technical construction RN 160/250



- |                                 |                                 |
|---------------------------------|---------------------------------|
| 1 Crane wheel                   | 10 Disc spring                  |
| 2 Idler shaft                   | 11 Self-aligning roller bearing |
| 3 Cover, without borehole       | 12 Spacer                       |
| 4 Circlip                       | 13 Flanged bearing housing      |
| 5 Compensating disc, 4 mm thick | 14 Locking screw                |
| 6 Sealing ring                  | 15 Retained nut                 |
| 7 Compensating disc, 1 mm thick | 16 Clamping sleeve              |
| 8 Hexagon head screw            |                                 |
| 9 Tightening disc               |                                 |

## Assembly and disassembly

### General

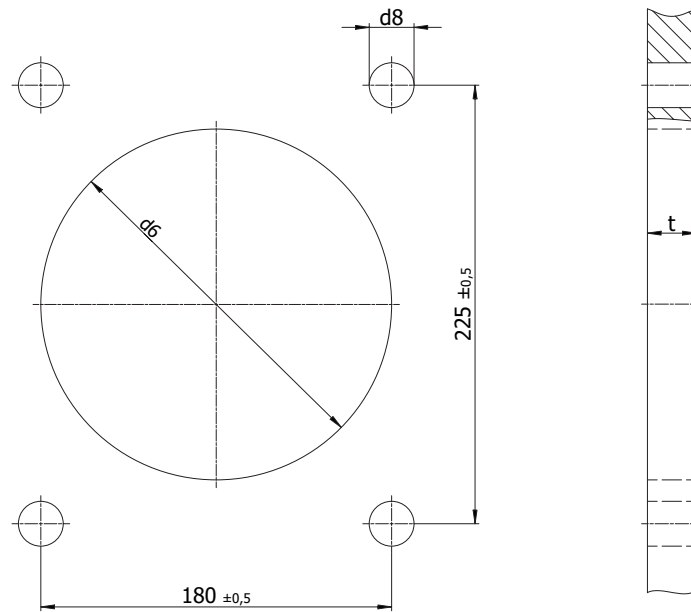
An assembly set (see page 3) is required for assembly respectively disassembly of the wheel sets RA/RN 400/500. Delivery does not include these instruments.

#### ATTENTION:

Some component parts have a high deadweight!  
Hoists are to be used for assembly and the relevant safety regulations (UVV) are to be observed.

### Installation and alignment of the wheel sets

Boreholes in the structural steelwork for the flanged bearing housings.



The structural steelwork of the carriage girders is ready. The holding fixture boreholes  $d_6$  for the flanged bearing housings (see table 1) are flame-cut respectively spindled out according to the given wheel bases. The fastening holes  $d_8$  for the retained nuts (15) are to be scribed and bored in their position to the centre  $d_6$ ,

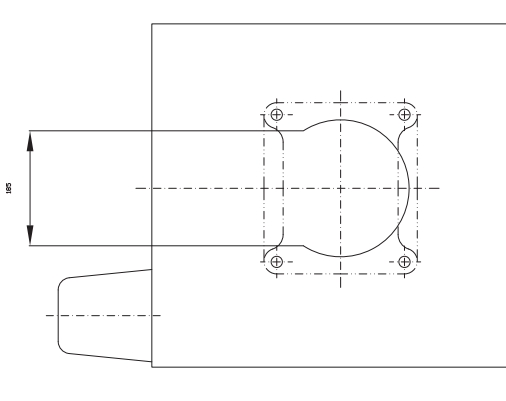
	$d_6^1$ + 1,0	$d_6^2$ H7	$d_8$ H11	t
RA/RN 400	214	210	18.5	> 18
RA/RN 500	214	210	23	> 25

Table 1: Ø of the holding fixture boreholes and fastening holes for the flanged bearing housings Required sheet metal thickness for the flanged bearing housing connection

<sup>1</sup> flame-cut

<sup>2</sup> spindled out

If the holding fixture boreholes for the flanged bearing housings are flame-cut, the flanged bearing housings are to be aligned in the carriage girder. The alignment of the flanges is made by levelling and optical-mechanical methods of measurement. The exact position of the flanges is fixed after alignment by clamping sleeves (16).

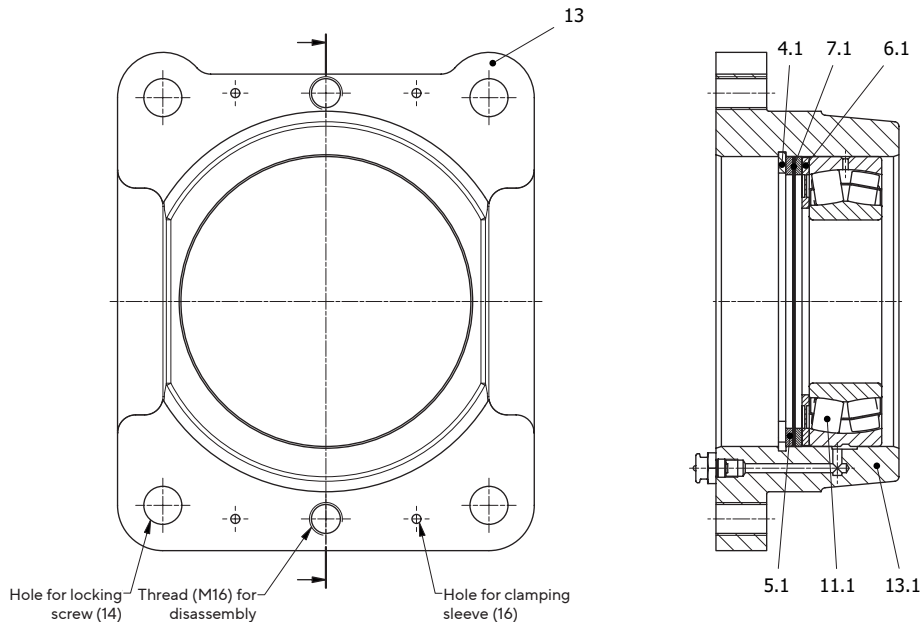


Picture 1

For the wheel set RA / RN 400 / 500 there is the possibility of corner-assembly because of the lateral flattened flanged bearing housings. In case of a slotted carriage girder (see picture no. 1) assembly and disassembly of the completely assembled wheel sets can be effected after a 90°-rotation of the flanged bearing housings.

### Assembly instructions

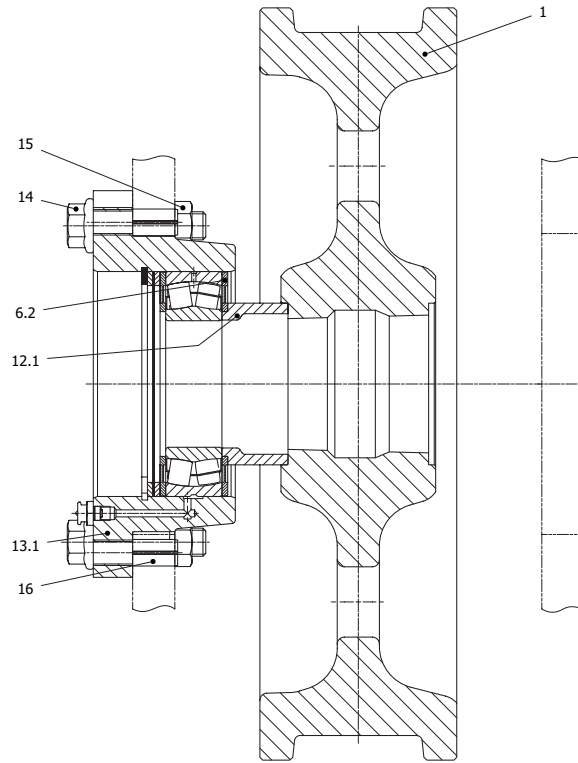
The following steps are to be made for assembly:



1. Fill the self-aligning roller bearings (11.1) with roller bearing grease
2. Insert the self-aligning roller bearing (11.1) together with the sealing ring (6.1) and the compensating discs (5.1, 7.1) (see table no. 2) into the flanged bearing housing (13.1) and assemble the circlip (4.1).

	5.1	5.2	7.1	7.2
RA/RN 400	2 x 4 mm thick	1 x 4 mm thick	1 x 1 mm thick	5 x 1 mm thick
RA/RN 500	2 x 4 mm thick	1 x 4 mm thick	-	5 x 1 mm thick

Table 2: Number and thickness of the compensating discs



3. Screw the outer flanged bearing housing (13.1) in the carriage girder with 4 locking screws (14) and 4 retained nuts (15). Screw the locking screws by a torque wrench to the prescribed torque (see table 3). Repeat this process until the required torque is achieved at all locking screws.

	Locking screw	Torque
RA/RN 400	8xM16x70	300 Nm
RA/RN 500	8xM20x80	470 Nm

Table 3: Torque of the locking screws

4. Bore the holes for the clamping sleeves to the required diameter d1 (see table 4). Bore the pin holes and insert the clamping sleeves (16).

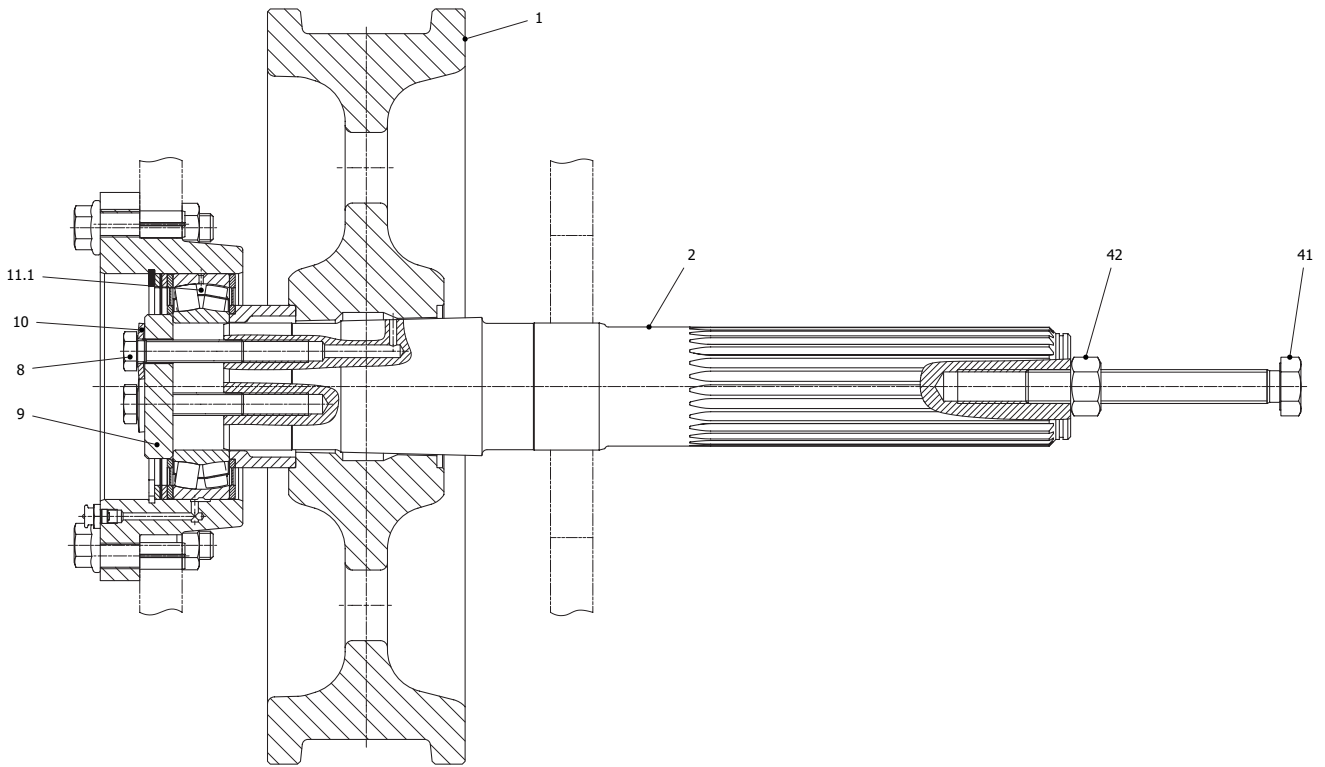
	Clamping sleeve	d1
RA/RN 400	14x60	14 mm
RA/RN 500	18x60	18 mm

Table 4: Clamping sleeves

5. Insert the sealing ring (6.2) and roll the crane wheel (1) with the spacer (12.1) into the carriage.

<sup>1</sup> Spacer ring 12.1 is made of steel, spacer ring 12.2 is made of Dufondal.



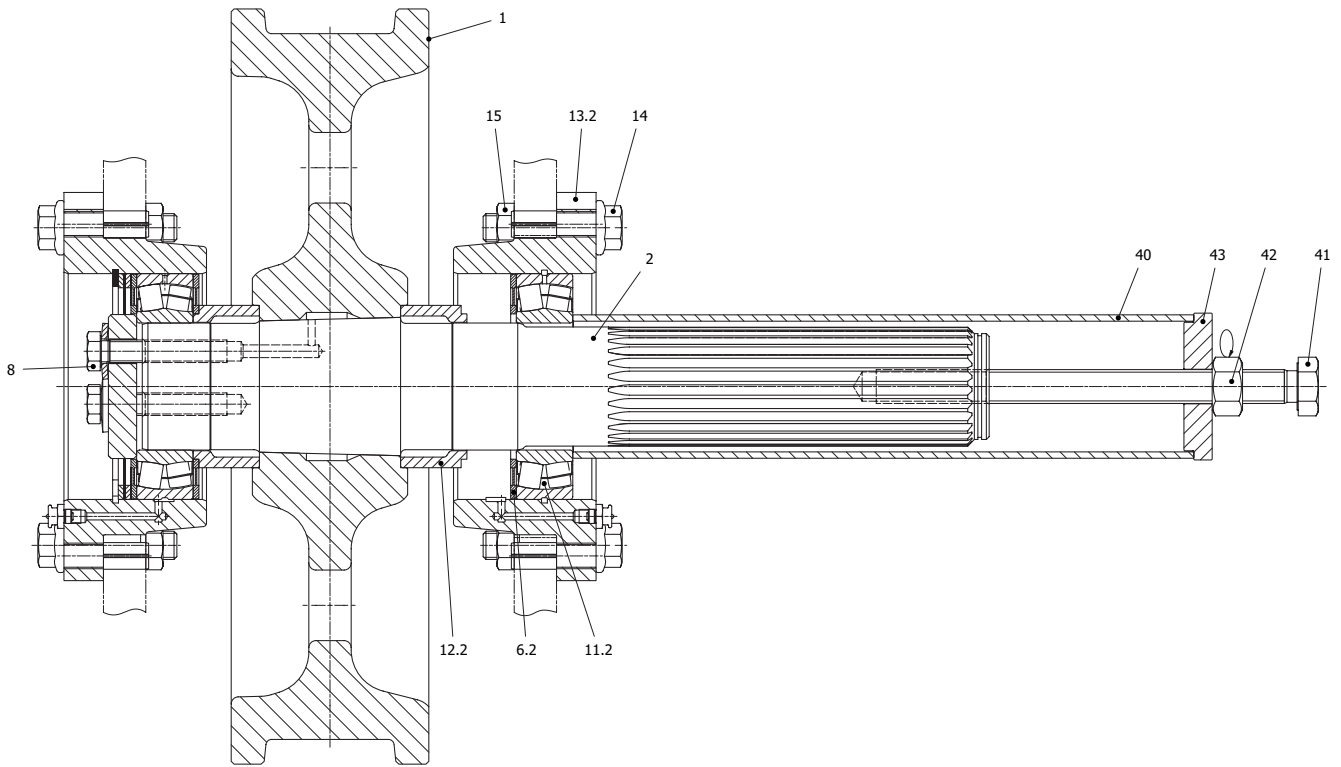


6. Push the crane wheel shaft (2) into the crane wheel (1).

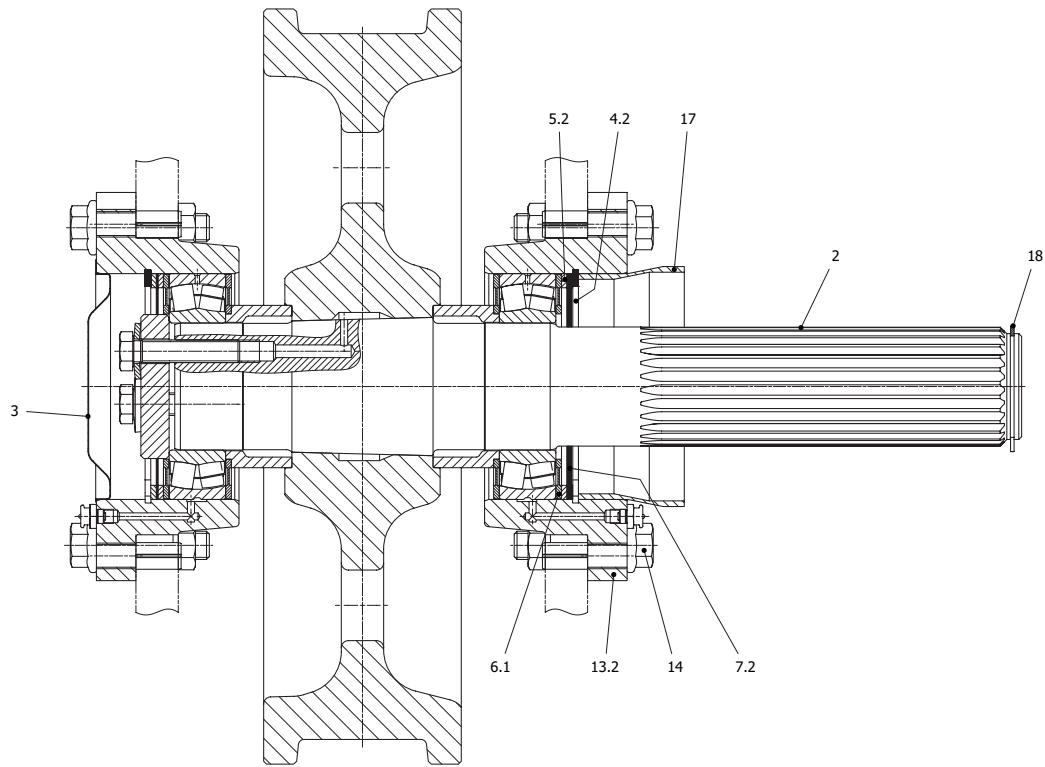
**HINWEIS:**

The crane wheel cone and the crane wheel shaft are specially coated. Attention is to be paid that the coating is not damaged when assembling the crane wheel shaft. In case of damage the coating is to be renewed. (Coating with Molykote sliding varnish 321 R. The instructions of the manufacturer are to be observed!). Crane wheel cone and shaft cone should not get into contact with oil or grease.

7. Insert the tightening disc (9) and the disc spring (10) and tighten the shaft (2) by the hexagon head screw (8) into the bearing (11.1). For counteracting, screw the hexagon head screw (41) on the opposite side into the shaft (2) and lock it with the hexagon head nut (42).



8. If the crane wheel is tightly at the stop of the shaft, the hexagon head screws (8) are to be tightened one after another by a torque wrench to 290 Nm. This process is to be repeated until the required torque is achieved at all screws (8).
9. Insert inner flanged bearing housing (13.2) into the carriage girder and screw it solid with 4 locking screws (14) and 4 retained nuts (15).
10. Insert spacer (12.2) and sealing ring (6.2) as well as the grease-filled self-aligning roller bearing (11.2). The self-aligning roller bearing (11.2) is to be pressed on the crane wheel shaft (2) to the stop at the spacer (12.2) by assembly tube (40), disc (43), hexagon head screw (41) and hexagon head nut (42).
11. Remove the assembly tube (40), disc (43) and hexagon head screw (41) with hexagon head nut (42).
12. Install all wheels according to point 1 - 10.
13. Alignment of the wheel sets by optical-mechanical methods of measurement. Examination of the wheel bases and the height dimensions as well as axial parallel in plan view and in elevation.



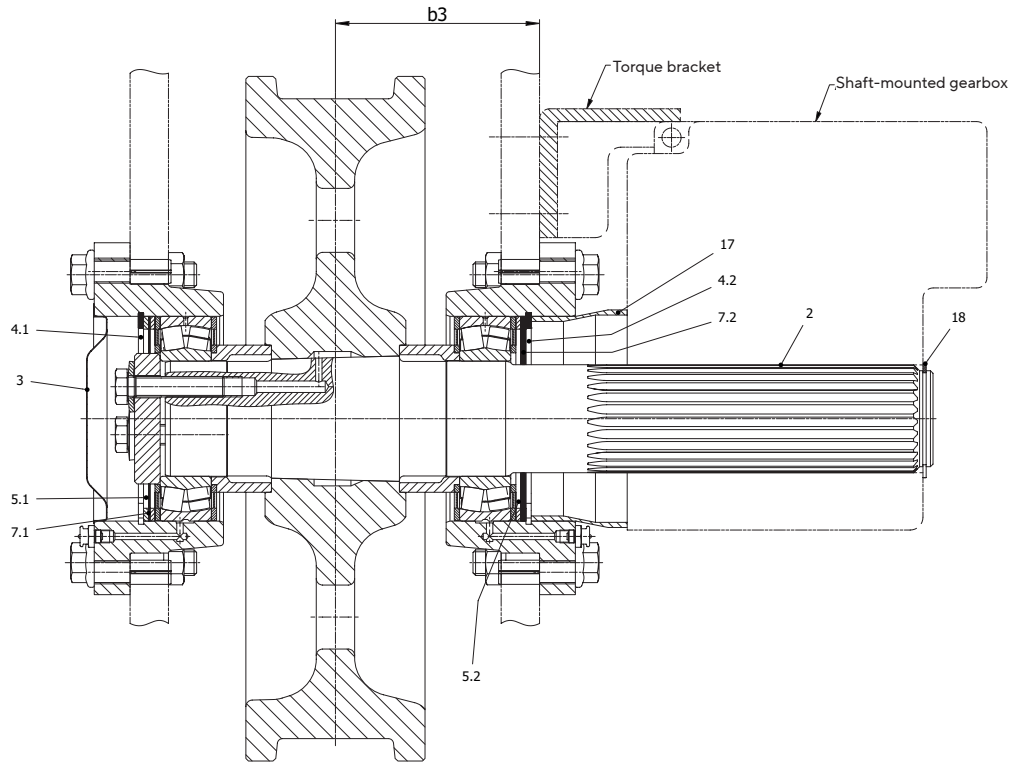
14. Tighten the locking screws of the inner flanged bearing housing (13.2) one after another to the prescribed torque (see table 3). Repeat this procedure until the required torque is achieved at all locking screws (14). Bore the holes for the clamping sleeves (see table 4) and drive the clamping sleeves (16).
15. Insert the sealing ring (6.1). Fill up the hollow-space between sealing ring and circlip groove with the remaining compensating discs (5.2, 7.2) (see table 2). Assemble the circlip (4.2). Assemble the cover (3) by light hammer blows on the centre edge. Insert the protective bellow (16).
16. Push the drive on the drive shaft (2), assemble the circlip (18) and fasten the drive at the torque support according to manufacturer's instructions.

**ATTENTION:**

Pay attention to greatest possible cleanliness when assembling. The cone borehole of the crane wheel and the taper of the shaft have to be free from contamination. The roller bearings as well are to be preserved from any dirt and dust.

Proceed analogous for assembly of the wheel set RN, but use a shorter assembly tube.

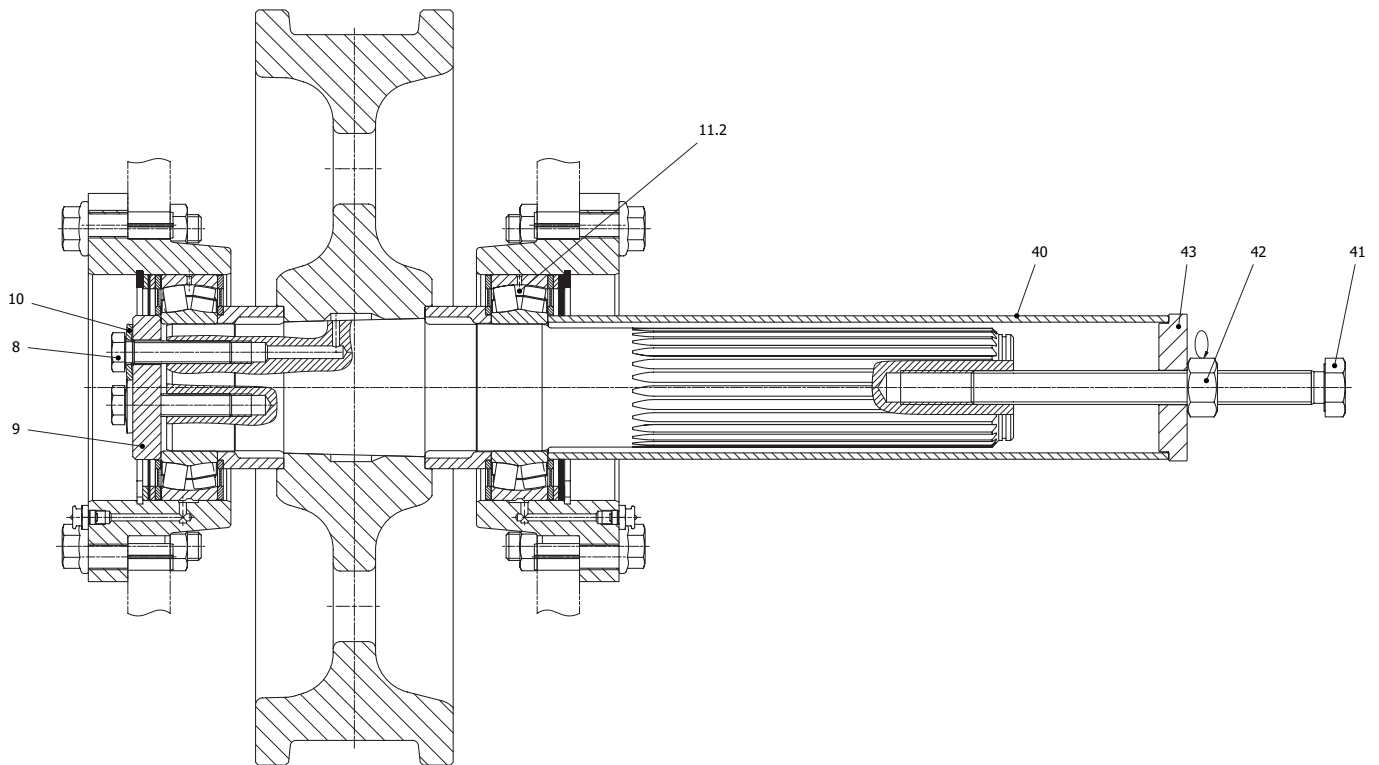
## Correction of the middle track width



1. Detach the hollow-shaft gearbox at the torque support, remove the circlip (18) and draw the drive off the drive shaft (2).
  2. Remove the cover (3) and the protective bellow (17).
  3. Jack up the crane to relieve the crane wheels.
  4. Remove the circlips (4.1, 4.2) and take out the required number of compensating discs (5.1, 7.1, 5.2, 7.2). Move the entire driving unit by the required dimension to the right or to the left.  
Maximum traversing possibility of the dimension „b<sub>3</sub>“:
- |            |            |
|------------|------------|
| RA/RN 400: | 85 ± 8 mm  |
| RA/RN 500: | 110 ± 8 mm |
5. Fill up the hollow-space between sealing rings and circlip grooves with compensating discs (5.1, 7.1, 5.2, 7.2) according to the traversing way and assemble the circlips (4.1, 4.2).
  6. Insert the cover (3) and the protective bellow (17).
  7. Push the drive on the drive shaft (2), assemble the circlip (18) and screw the hollow shaft gearbox at the torque support.

## Disassembly instructions

- 1 Detach the hollow-shaft gearbox at the torque support, remove the circlip (18) and draw the drive off the drive shaft (2).
2. Remove the cover (3) and the protective bellow (17).
3. Jack up the crane to relieve the crane wheels.



4. Detach the hexagon head screw (8) and remove it with disc spring (10) and tightening disc (9).
5. Fasten the assembly tube (40) and the disc (43) by the hexagon head screw (41) and the hexagon head nut (42) against the self-aligning roller bearing (11.2).

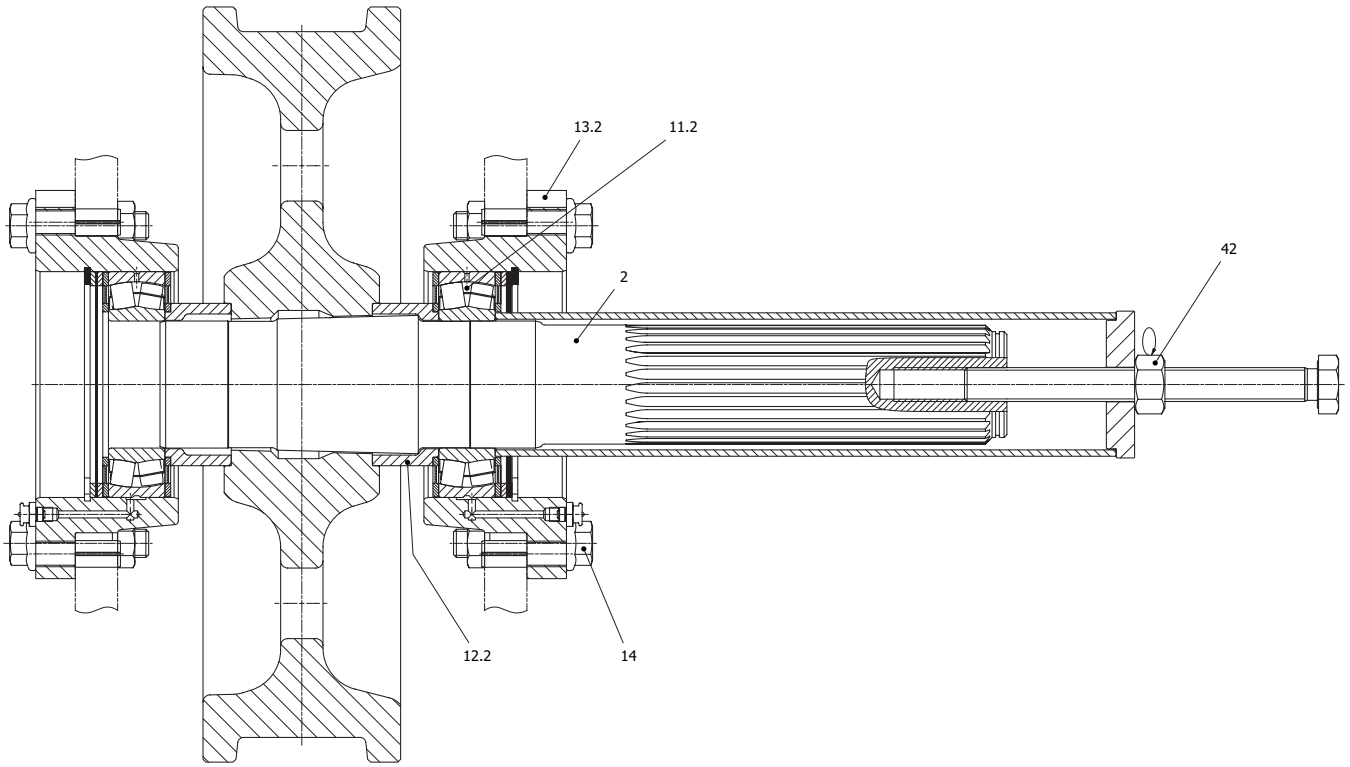
The stressing in the connection can be detached by hammer blows on the running surface of the crane wheel.

Detaching of the taper pressure connection crane wheel - shaft can also be effected hydraulically by the hydraulic pressure connection of the shaft. A hydraulic pump with a pressure of at least 3000 bar and a reducing nipple M 16 / R 1/4" are required for this procedure. The nipple is to be screwed into the 60°-countersunk oil pressure borehole M 16 of the shaft.

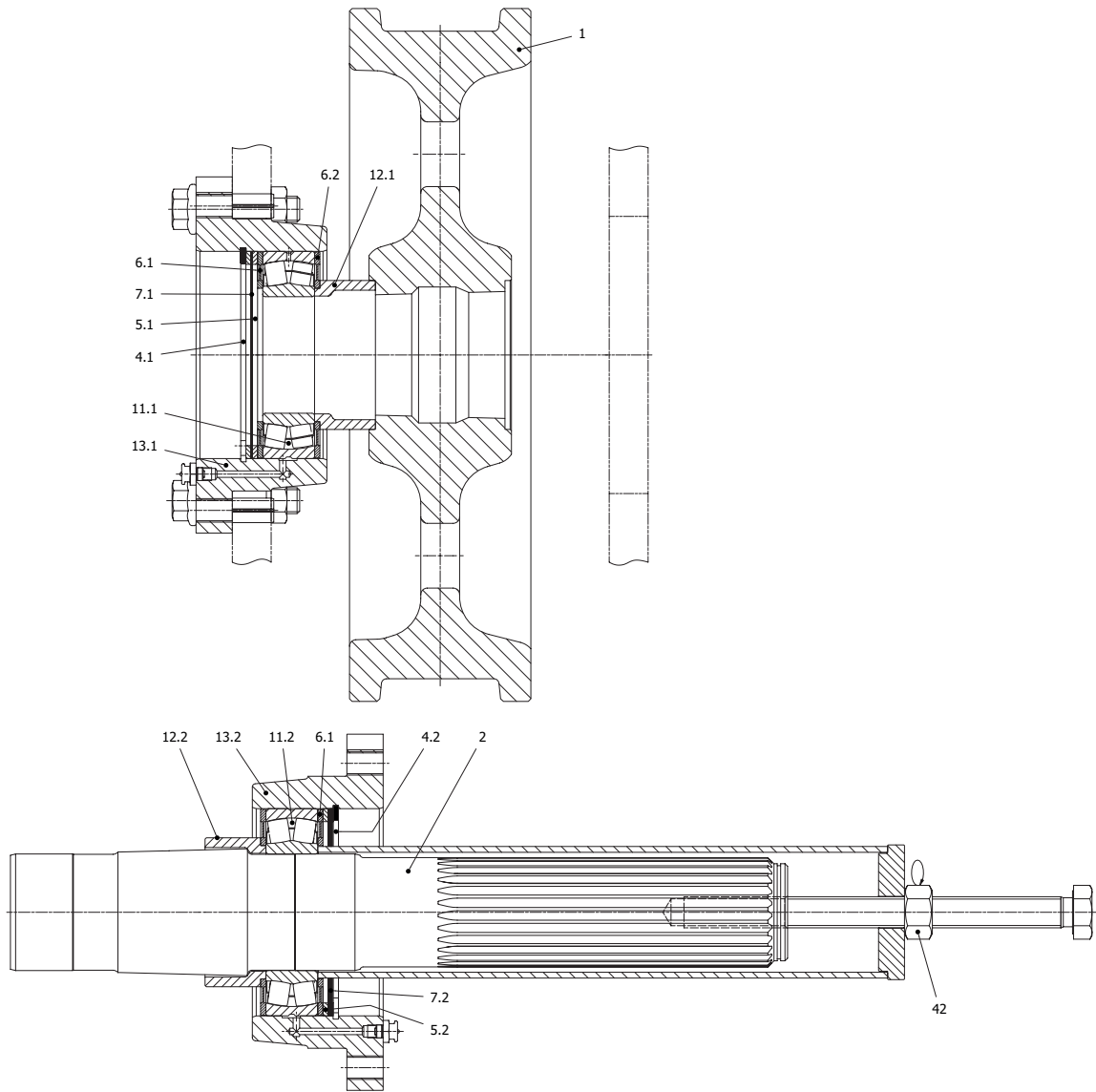
Detaching of the taper pressure connection crane wheel - shaft is effected by widening the crane wheel cone by a hydraulic pump. For that, oil is pressed with high pressure (3000 bar) through the crane wheel shaft (2) into the taper connection, so that it loosens itself under prestressing. By operating the hydraulic pump and tightening the hexagon head nut (42) at the same time, draw the crane wheel shaft out of the cone.

### ATTENTION::

For safety reasons the circlips (4.1, 4.2) and the compensating discs (5.1, 7.1, 5.2, 7.2) have to remain installed when detaching the taper pressure connection.



6. Draw the crane wheel shaft (2) by tightening the hexagon head nut (42) until the crane wheel shaft (2) stops at the spacer (12.2).
7. Screw out the hexagon head screws (14).
8. Press the clamping sleeves (16) out of the flanged bearing housing (13.2).



9. Draw the crane wheel shaft (2) with the complete flanged bearing housing (13.2) entirely out of the crane wheel (1).

10. Roll the crane wheel (1) with the spacer (12.1) out of the carriage girder. Remove the sealing ring (6.2).

If a replacement of the self-aligning roller bearing (11.1) is necessary, detach circlip (4.1) first and after that remove compensating discs (5.1, 7.1). The self-aligning roller bearing (11.1) can be pressed out to the inside now.

For replacing the self-aligning roller bearing (11.2) remove circlip (4.2), compensating discs (5.2, 7.2) and sealing ring (6.1) first. Remove the flanged bearing housing (13.2). Draw the self-aligning roller bearing (11.2) by a withdrawing tool off the crane wheel shaft (2).

Proceed analogous for disassembly of the wheel set RN, but use a shorter assembly tube.

## Maintenance

### Roller bearings

The self-aligning roller bearings are to be filled with suitable roller bearing grease before assembly. The lubricant has to be absolutely faultless, clean and suitable for roller bearings.

Recommendation:

Lithium soap grease (EP-alloyed)

Consistency class 2

Drop point approximately 190°C

Application temperature - 30 / + 140°C

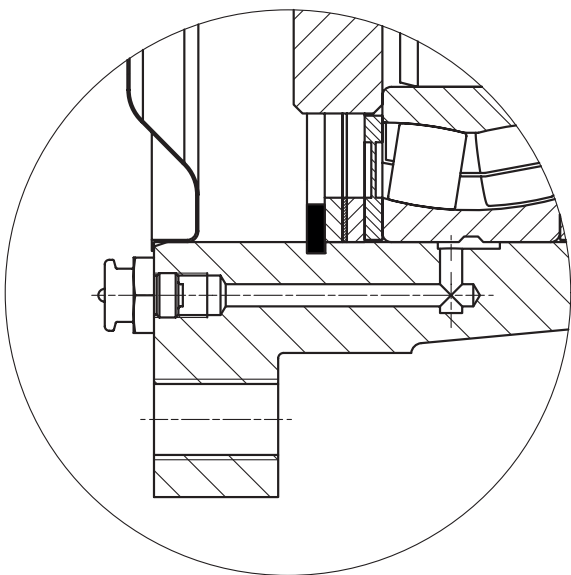
for example:           Texaco MULTIFAK  
                                  or comparable products

The roller bearings of the wheel sets RA / RN 400 and RA / RN 500 can be relubricated by lubrication nipples in the flanged bearing housing (see picture no. 2). The self-aligning roller bearings are to be relubricated after approximately 2000 operating hours.

Dirty self-aligning roller bearings because of extreme operation conditions are to be disassembled according to the instructions in the chapter disassembly instructions (page 13 pp.). After that the bearings are to be cleaned properly and are to be filled with suitable roller bearing grease before putting into operation again.

If much grease comes out because of damaged seals (because of outer influences), relubrication is necessary in shorter intervals. If the seal is considerably damaged, it should be replaced and the bearing should be examined for damages.

The indicated maintenance intervals are suited to normal operating conditions. The maintenance intervals are to be shortened for extreme operating conditions and contaminations.





**Crane wheel**

The running surface and the wheel flanges are to be examined for wear quarterly. If the wear of the wheel flanges and the running surface diameter is more than 10 mm, the corresponding crane wheel is to be replaced.

**Screwing:**

The prescribed torque of the hexagon head screws (8) is to be examined after 2 - 3 months, after that yearly within the scope of the recurrent inspection according to UVV - cranes § 26 I (VBG 9) and the principles for expert inspections (ZH1/27).

Torsion angle  $\leq 60^\circ$  → screw is all right

Torsion angle  $\geq 60^\circ$  → screw is to be replaced

**Reference standards and guidelines**

DIN 7168	Generally applicable tolerance limits (free-size tolerances), linear and angular measures
DIN 8570	Free-size tolerances for welded structures
Sheet 1	Linear measures and angles
Sheet 3	Form and position
VDI 3571	Manufacturing tolerances for bridge cranes
VDI 3576	Rails for crane installations, rail connections, rail clamps, tolerance limits

## Parts list RA / RN 400

Part no.	Number of pieces for			
	RA	RN		
1	1	1	Crane wheel Ø 400 x b1	GGG - 70
2	1	-	Drive shaft	42CrMo4V
2	-	1	Idler shaft	C 45
3	1	2	Cover 160, without borehole	
4	2	2	Circlip I 160	DIN 472
5	3	3	Compensating disc 160 / 140 x 4	
6	4	4	Sealing ring 160 / 93 x 4	
7	6	6	Compensating disc 160 / 140 x 1	
8	2	2	Hexagon head screw M16 x 70	DIN 933 - 10.9
9	1	1	Tightening disc	
10	2	2	Disc spring 16	DIN 6796
11	2	2	Self-aligning roller bearing 213 15	DIN 635
12	2	2	Spacer	
13	2	2	Flanged bearing housing	GGG - 50
14	8	8	Locking screw M 16 x 70	Verbus-Ripp 10.9
15	8	8	Retained nut M 16	
16	8	8	Clamping sleeve 14 x 60	DIN 1481
17	1	-	Protective bellow	
18	1	-	Circlip AK 42 (AF 08) or circlip AK 58 (AF 10)	DIN 983 DIN 983
19	1	-	Feather key A 14 x 9 x 90 (FA 70) or feather key A 18 x 11 x 110 (FA 80)	DIN 6885 DIN 6885
1)				
41	1	1	Hexagon head screw M16 x 200 (FA 70) or hexagon head screw M20 x 200 (FA 80) or hexagon head screw M24 x 140 M24 x 140 DIN 933	DIN 933 DIN 933 DIN 933
42	1	1	Hexagon head nut M16 (FA 70) or hexagon head nut M20 (FA 80) or hexagon head nut M24 (AF 08, AF 10, idler shaft)	DIN 934 DIN 934 DIN 934

## Parts list RA / RN 500

Part no.	Number of pieces for			
	RA	RN		
1	1	1	Crane wheel Ø 400 x b1	GGG - 70
2	1	-	Drive shaft	42CrMo4V
2	-	1	Idler shaft	C 45
3	1	2	Cover 160, without borehole	
4	2	2	Circlip I 160	DIN 472
5	3	3	Compensating disc 160 / 140 x 4	
6	4	4	Sealing ring 160 / 103 x 4	
7	6	6	Compensating disc 160 / 140 x 1	
8	2	2	Hexagon head screw M16 x 70	DIN 933 - 10.9
9	1	1	Tightening disc	
10	2	2	Disc spring 16	DIN 6796
11	2	2	Self-aligning roller bearing 222 18	DIN 635
12	2	2	Spacer	
13	2	2	Flanged bearing housing	GGG - 50
14	8	8	Locking screw M 20 x 80	Verbus-Ripp 10.9
15	8	8	Retained nut M 20	
16	8	8	Clamping sleeve 18 x 60	DIN 1481
17	1	-	Protective bellow	
18	1	-	Circlip AK 75 (AF 12)	DIN 983
19	1	-	Feather key A 22 x 14 x 140 (FA 100)	DIN 6885
1)				
41	1	1	Hexagon head screw M16 x 200 (FA 70) or hexagon head screw M20 x 200 (FA 80) or hexagon head screw M24 x 140 (AF 08, AF 10, idler shaft)	DIN 933 DIN 933 DIN 933
42	1	1	Hexagon head nut M16 (FA 70) or hexagon head nut M20 (FA 80) or hexagon head nut M24 (AF 08, AF 10, idler shaft)	DIN 934 DIN 934 DIN 934



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Subject to alterations by the manufacturer for the purposes of further technical development!

No claims can be derived from the information, figures and descriptions given in these operating instructions.

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