

## Installation and operating instructions for torsionally stiff gear couplings RDZ...DTO/...DFO

E 06.697e



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<b>RINGSPANN</b>	<b>Installation and operating instructions for torsionally stiff gear couplings RDZ...DTO/...DFO</b>			<b>E 06.697</b>	
As of: 17.02.2023	Version: 01	Signed: RUPD	Checked: SCHW	Number of pages: 26	Page: 2

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## Important

Before installation and commissioning of the product takes place, these installation and operating instructions must be read carefully. Notes of caution and hazard warnings are to be paid particular attention to.

These installation and operating instructions apply on condition that the product meets the selection criteria for its proper use. The selection and dimensioning of the product are not the subject of these installation and operating instructions.

If these installation and operating instructions are not observed or are interpreted wrongly, this shall invalidate any product liability and warranty of RINGSPANN GmbH; the same also applies in the case that our product is taken apart or changed.

These installation and operating instructions are to be kept in a safe place and must, in the event of onward delivery of our product – be it individually or as part of a machine – be passed on along with the product so that the user has access to them.

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## Safety information

- The installation and commissioning of our product may only be carried out by trained personnel.
- Repair work may only be performed by the manufacturer or by authorised RINGSPANN agencies.
- If there is suspected malfunctioning, the product, or the machine into which it is built, must be taken out of operation immediately and RINGSPANN GmbH or an authorised RINGSPANN agency is to be informed.
- The power supply is to be switched off during work on electrical components.
- Rotating parts must be secured by the operator against unintentional touching.
- In the case of supplies made to a foreign country, the safety regulations applicable in that country are to be taken into consideration.

### German original version!

If there should be any discrepancies between the German original and versions of these installation and operating instructions in other languages, the German version shall take precedence.

<b>RINGSPANN</b>	<b>Installation and operating instructions for torsionally stiff gear couplings RDZ...DTO/...DFO</b>			<b>E 06.697</b>	
As of: 17.02.2023	Version: 01	Signed: RUPD	Checked: SCHW	Number of pages: 26	Page: 3

## Contents

### 1. General information

- 1.1. Function
- 1.2. General safety instructions
- 1.3. Other applicable provisions, standards etc.
- 1.4. Classification in accordance with EC Machinery Directive 2006/42/EC

### 2. Design and function / parts list

- 2.1. Labelling
- 2.2. Dimensions
- 2.3. Parts list

### 3. Intended use

### 4. Warning signs / Impermissible use

### 5. Condition as delivered

### 6. Storage

### 7. Technical prerequisite for reliable operation

- 7.1. Permissible operating parameters
- 7.2. Permissible misalignments
- 7.3. Manufacturing the hub bore

### 8. Assembly

- 8.1. General assembly instructions
- 8.2. Assembly description
- 8.3. Alignment procedure
  - 8.3.1. Check the radial misalignment
  - 8.3.2. Check the angular misalignment

### 9. Start-up and lubrication

- 9.1. Start-up
- 9.2. Lubrication

### 10. Operational disturbances

### 11. Maintenance and repair

- 11.1. General maintenance work
- 11.2. Changing the lubricant

### 12. Spare part stockpiling

### 13. Disposal

### 14. Supplement for operation in areas with potentially explosive atmosphere

- 14.1. Normal operation
  - 14.1.1. Ambient conditions
  - 14.1.2. Explosive atmosphere in category I
  - 14.1.3. Explosive atmosphere in category II

<b>RINGSPANN</b>	<b>Installation and operating instructions for torsionally stiff gear couplings RDZ...DTO/...DFO</b>			<b>E 06.697</b>	
As of: 17.02.2023	Version: 01	Signed: RUPD	Checked: SCHW	Number of pages: 26	Page: 4

14.1.4. Possible misuse

14.1.5. Instructions for use

14.2. Instructions on occupational health and safety

14.3. Setup and assembly

14.4. Control, inspection and repair

14.5. Testing

**15. Declaration of Conformity according to Directive 2014/34/EU**

<b>RINGSPANN</b>	<b>Installation and operating instructions for torsionally stiff gear couplings RDZ...DTO/...DFO</b>			<b>E 06.697</b>	
As of: 17.02.2023	Version: 01	Signed: RUPD	Checked: SCHW	Number of pages: 26	Page: 5

## 1. General information

### 1.1. Function

The main task of the torsionally stiff gear coupling consists in transferring the torque of one shaft end onto another element. Additionally, the coupling is designed to compensate angular, radial and axial misalignments.

### 1.2. General safety instructions

**Safety takes the highest priority for all works with and on the coupling.**

To ensure this, the following safety instructions must be observed:

- During installation and maintenance work, the drive motor must be secured against unintended start-up and the load side against turning back.
- Accidental touching of the coupling during operation must be prevented with a suitable cover or protective device.
- Do not reach into the working area of the coupling during operation.

### 1.3. Other applicable provisions, standards etc.

The design of the couplings is carried out with the help of operating factors that come from experience (see RINGSPANN catalogue "shaft coupling"). If the operating conditions (e.g. output, speed) should change, the original design of the coupling must be reviewed along with the load-bearing capacity of the shafts and the used shaft-hub-connections.

### 1.4. Classification in accordance with EC Machinery Directive 2006/42/EC

Type RDZ...DTO/...DFO couplings are a machine element. Since machine elements do not fall under EC Machinery Directive 2006/42/EC, RINGSPANN does not draw up a declaration of incorporation. All important information with regards to the installation, commissioning and operation is explained in the following.

## 2. Design and function / parts list

### 2.1. Labelling

Depending on the coupling size, the parts are labelled as follows:

Hubs:

- RINGSPANN logo
- Abbreviated designation

## 2.2. Dimensions

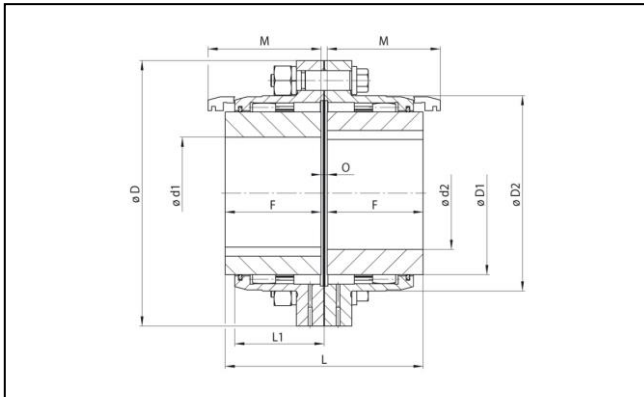


Figure 2.1: Drawing RDZ...DTO

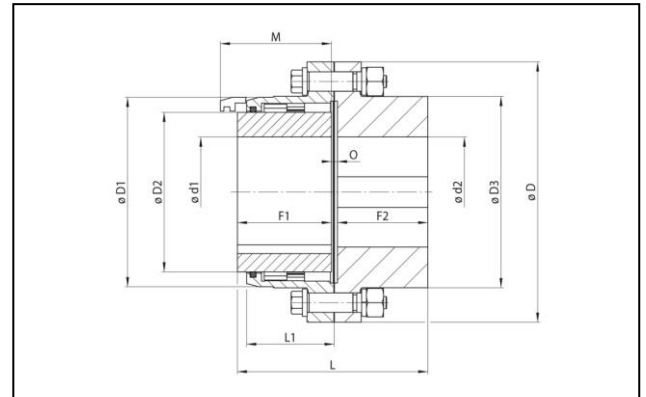


Figure 2.2: Drawing RDZ...DFO

Size	D mm	D1 mm	D2 mm	F mm	L mm	L1 mm	M mm	O mm	Weight with max. bore kg
0010	116	69	84	43	89	39	51	3	4.4
0015	152	86	105	50	103	48	61	3	9
0020	178	105	127	62	127	60	76	3	15
0025	213	131	155	77	159	72	92	5	27
0030	240	152	181	91	187	84	106	5	40
0035	279	178	211	107	220	98	130	6	65
0040	318	210	250	121	248	111	145	6	96
0045	346	235	274	135	278	123	165	8	131
0050	389	254	306	153	314	141	183	8	186
0055	425	279	334	168	344	158	203	8	247
0060	457	305	366	188	384	169	228	8	299
0070	527	356	425	221	451	196	266	9	473
0080	590	385	485	249	508	243	300	10	682
0090	660	420	535	276	565	265	325	13	898
0100	711	470	595	305	623	294	355	13	1,242

Table 2.1: Dimensions RDZ...DTO

Size	D mm	D1 mm	D2 mm	D3 mm	F1 mm	F2 mm	L mm	L1 mm	M mm	O mm	Weight with max. bore kg
0010	116	84	69	84	43	40	87	39	51	4	4.5
0015	152	105	86	107	50	47	101	48	61	4	9.5
0020	178	127	105	130	62	59	125	60	76	4	15.5
0025	213	155	131	157	77	74	156	72	92	5	27.5
0030	240	181	152	182	91	88	184	84	106	5	41.5
0035	279	211	178	212	107	102	215	98	130	6	67.0
0040	318	250	210	250	121	116	245	111	145	8	100.0
0045	346	274	235	276	135	131	274	123	165	8	135.0
0050	389	306	254	309	153	148	310	141	183	9	195.0
0055	425	334	279	334	168	173	350	158	203	9	261.0
0060	457	366	305	366	188	185	384	169	228	9,5	316.0
0070	527	425	356	425	221	218	452	196	266	11	500.0
0080	590	485	385	470	249	249	511	243	300	13	715.0
0090	660	535	420	518	276	276	567	265	325	15	969.0
0100	711	595	470	572	305	305	626	294	355	16	1,259.0

Table 2.2: Dimensions RDZ...DFO

### 2.3. Parts list

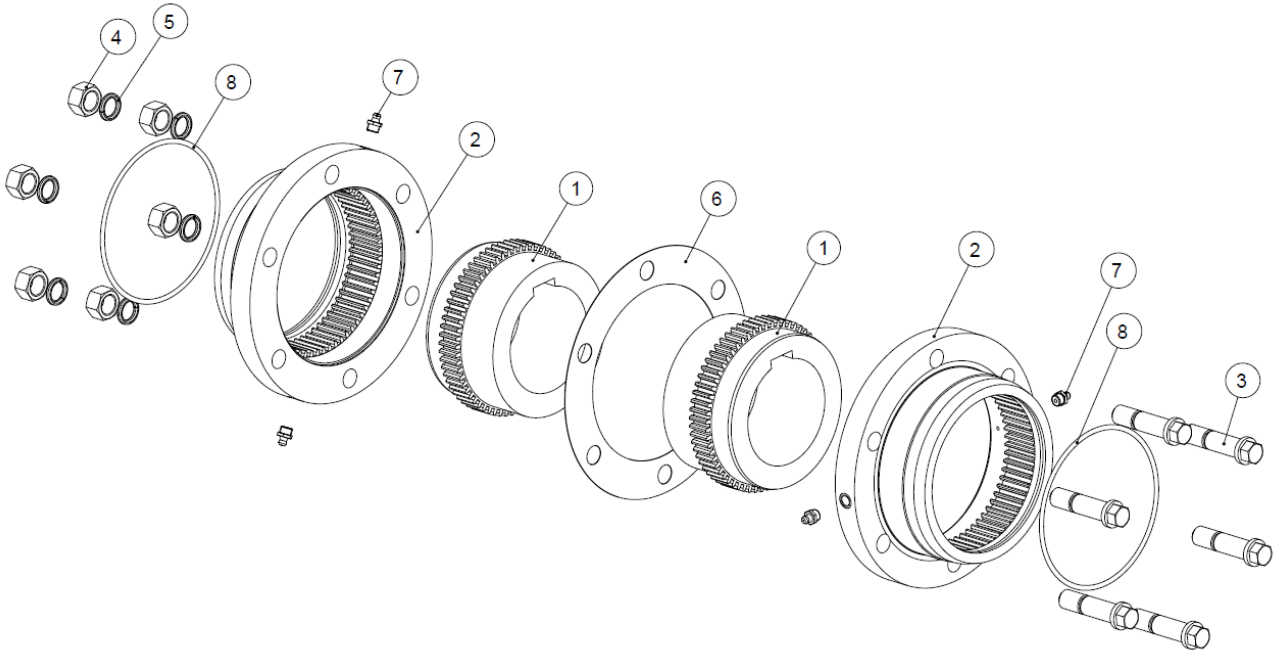


Figure 2.3: RDZ...DTO

Position	Quantity	Description
1	2	Hub
2	2	Coupling halves, flexible
3	Size dependent	Fitting screw
4	Size dependent	Hexagon nut
5	Size dependent	Spring washer
6	1	Seal
7	4	Lubricating nipple
8	2	O-ring

Table 2.3: Parts list RDZ..DTO

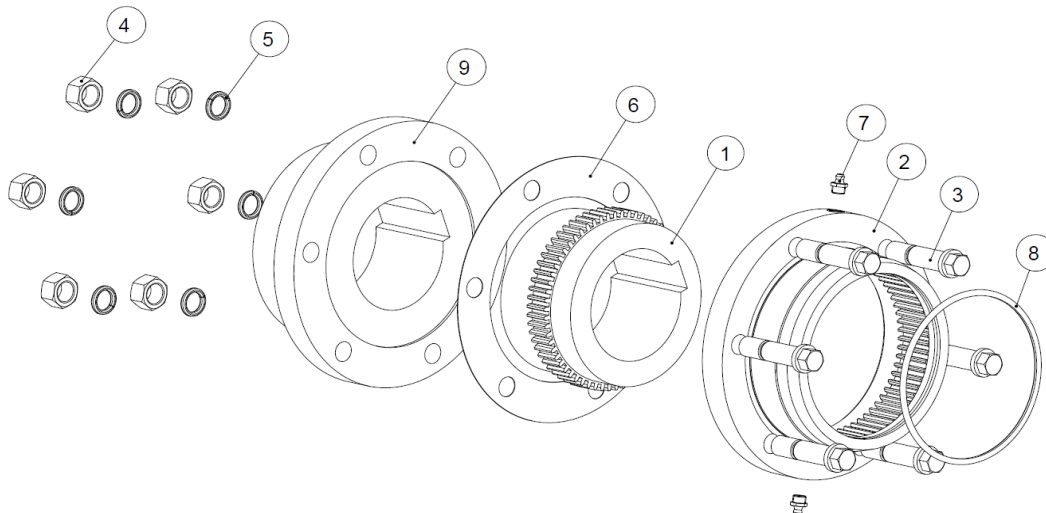


Figure 2.4: RDZ...DFO

<b>RINGSPANN</b>	<b>Installation and operating instructions for torsionally stiff gear couplings RDZ...DTO/...DFO</b>			<b>E 06.697</b>	
As of: 17.02.2023	Version: 01	Signed: RUPD	Checked: SCHW	Number of pages: 26	Page: 8

Position	Quantity	Description
1	1	Hub
2	1	Coupling halves, flexible
3	Size dependent	Fitting screw
4	Size dependent	Hexagon nut
5	Size dependent	Spring washer
6	1	Seal
7	2	Lubricating nipple
8	1	O-ring
9	1	Coupling halve, rigid with hub

Table 2.4: Parts list RDZ..DFO

### 3. Intended use

The coupling may only be installed, operated and serviced if

- the operating instructions have been read and understood,
- the executing person possesses the necessary qualifications,
- authorisation has been given by the company.

The coupling type RDZ...DTO and RDZ...DFO may only be operated within the operating limits specified in section "7. Technical prerequisite for reliable operation".

**RINGSPANN shall not assume any liability for damages that result from unauthorised constructional changes or an unintended use.**

### 4. Warning signs / impermissible use


An impermissible use is given if:

- the shaft-hub-connection was not designed correctly
- the coupling hubs have been thermally overloaded during assembly
- the fit pair for parts to be joined has not been coordinated correctly
- the parameters necessary for the selection of the coupling were not communicated
- the tightening torques of the screw connection do not correspond with the specifications
- the coupling is wrongly fitted
- parts from other manufacturers are used
- damaged coupling parts are used

The further operation of coupling type RDZ...DTO/...DFO is not permissible under the following conditions:

- if the permissible limits of use (torque, speed, permissible displacements, ...) are exceeded
- exceeding or falling below the permissible temperature limits
- if the wear limit of the parts is reached
- changed running noises or the occurrence of vibrations

If the unit should be operated despite the aforementioned states, it can result in damages to the coupling and the drivetrain.

	<p><b>Attention!</b> RINGSPANN shall not assume any liability for any damages that result in the event of any impermissible use.</p>
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<b>RINGSPANN</b>	<b>Installation and operating instructions for torsionally stiff gear couplings RDZ...DTO/...DFO</b>			<b>E 06.697</b>	
As of: 17.02.2023	Version: 01	Signed: RUPD	Checked: SCHW	Number of pages: 26	Page: 9

## 5. Condition as delivered

Couplings are generally delivered ready-for-installation in individual parts. Upon customer request, pre-bored hubs are also available. If the hub bores are manufactured by the customer, the information in chapter 7.3 must be observed:

## 6. Storage

The coupling hubs can be stored in a room that has a roof and is dry. The hubs and coupling halves, as well as all screws and nuts, are delivered in preserved condition and can be stored for up to 6 months. In the event of a longer storage, the corrosion protection should be refreshed.

The maximum storage duration of the O-rings is approx. 3 years under optimum storage conditions. The storage, cleaning and maintenance should be carried out in accordance with the provisions of DIN 7716 and ISO 2230. Storage is best carried out in sealed polyethylene bags.

Optimum service life of the coupling is given if the storage rooms:

- have a roof and are dry,
- are free of ozone-producing equipment,
- have a relative humidity of less than 65 %,
- have a storage temperature between +5 °C and +20 °C,
- are free of condensation.

## 7. Technical prerequisite for reliable operation

### 7.1. Permissible operating parameters

Size	RDZ...DTO				RDZ...DFO			
	Nominal torque $T_{KN}$ Nm	Nominal power at 100 min <sup>-1</sup> $P_{K100}$ kW	Max. speed $n_{max}$ min <sup>-1</sup>	Moment of inertia with max. bore $J_K$ kgm <sup>2</sup>	Nominal torque $T_{KN}$ Nm	Nominal power at 100 min <sup>-1</sup> $P_{K100}$ kW	Max. speed $n_{max}$ min <sup>-1</sup>	Moment of inertia with max. bore $J_K$ kgm <sup>2</sup>
0010	1 330	14	8 000	0.0052	1 330	14	8 000	0.0055
0015	2 860	30	6 500	0.0192	2 860	30	6 500	0.0204
0020	5 000	53	5 600	0.041	5 000	53	5 600	0.0436
0025	10 000	105	5 000	0.105	10 000	105	5 000	0.1110
0030	16 000	168	4 400	0.195	16 000	168	4 400	0.2100
0035	22 000	231	3 900	0.454	22 000	231	3 900	0.4770
0040	32 000	336	3 600	0.86	32 000	336	3 600	0.9200
0045	45 000	472	3 200	1.39	45 000	472	3 200	1.4680
0050	62 000	650	2 900	2.53	62 000	650	2 900	2.7300
0055	84 000	880	2 650	3.83	84 000	880	2 650	4.2000
0060	115 000	1 205	2 450	5.21	115 000	1 205	2 450	5.7000
0070	174 000	1 823	2 150	11	174 000	1 823	2 150	12.0500
0080	252 000	2 639	1 750	20.72	252 000	2 639	1 750	21.7700
0090	290 000	3 037	1 550	34.95	290 000	3 037	1 550	36.6000
0100	391 500	4 100	1 450	55.95	391 500	4 100	1 450	56.2700

Table 7.1: Permissible operating parameters

### 7.2. Permissible misalignments

Size	Max. permissible misalignments RDZ...DTO			Max. permissible misalignments RDZ...DFO	
	Axial $\Delta K_a$ [mm]	Radial $\Delta K_r$ [mm]	Angular $\Delta K_w$ [°]	Axial $\Delta K_a$ [mm]	Angular $\Delta K_w$ [°]
0010	±0.5	0.5	1.5	±0.25	0.75
0015	±0.5	0.8			
0020	±0.5	1.0			
0025	±0.5	1.2			
0030	±0.5	1.4			
0035	±1	1.7			
0040	±1	2.0			
0045	±1	2.1			
0050	±1	2.6			
0055	±1	2.9			
0060	±2	3.2			
0070	±2	3.7			
0080	±2	4.2			
0090	±2	4.8			
0100	±3	5.5			

Table 7.2: Maximum permissible misalignments

The maximum permissible displacement values (table 7.2) must be adhered to and may not occur at the same time. In the event of the simultaneous occurrence of radial and angular offset, displacements need to be exploited differently percentage-wise (see figure 7.2). If not observed, damage to the coupling may result.

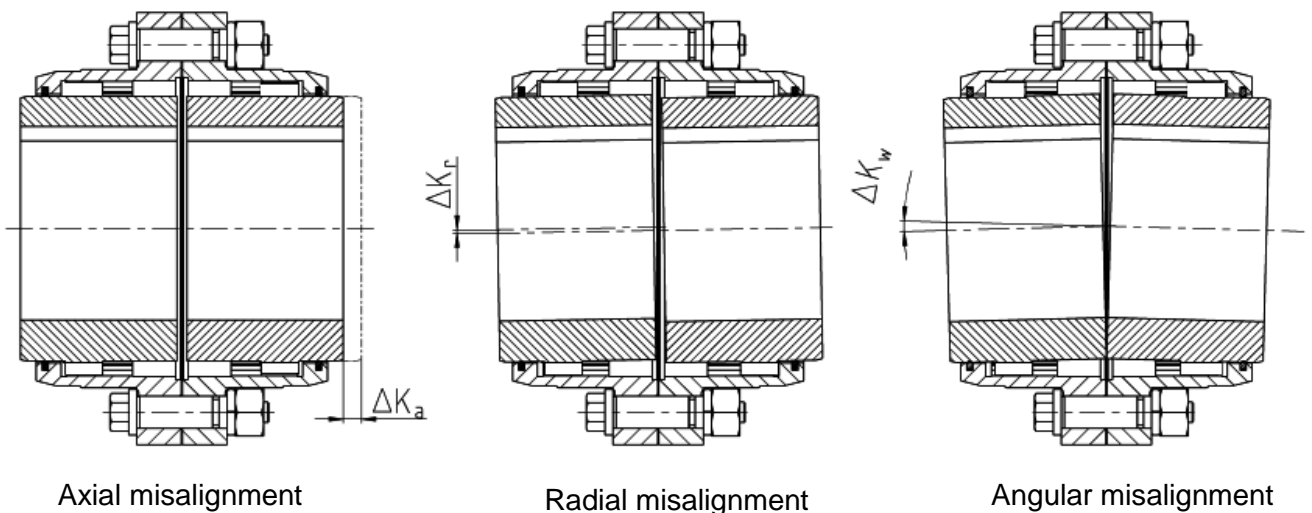


Figure 7.2: Misalignment types

The figure 7.2 shows the relationship for radial ( $K_r$ ) and angular displacements ( $K_w$ ) occurring at the same time:

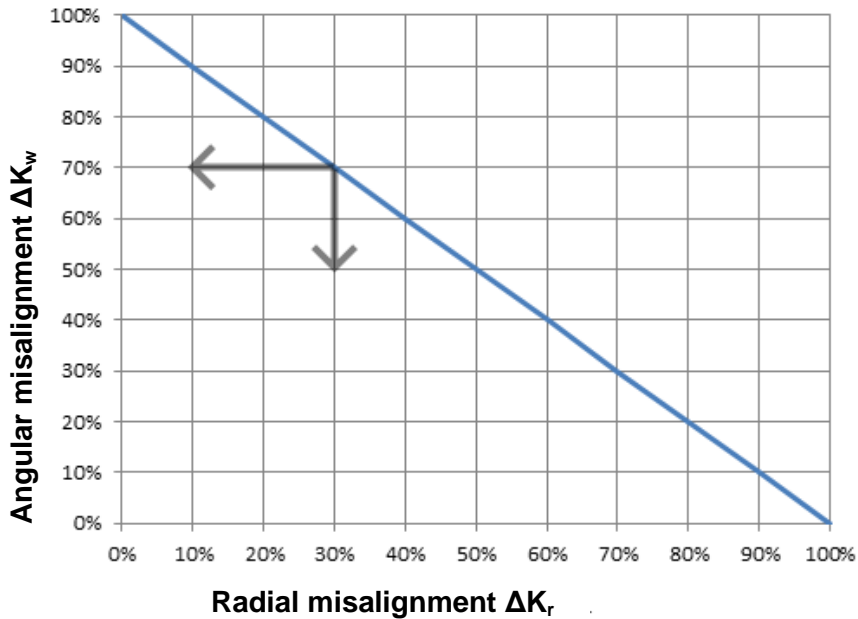


Figure 7.2: Misalignment combination

The displacement as a percentage is calculated as follows:

$$\Delta K[\%] = \frac{\Delta K}{\text{max. permissible misalignment}}$$

### 7.3. Manufacturing the hub bore



**Life-threatening danger!**

The max. permissible bore diameters specified in table 7.3 may not be exceeded. If the permissible values are exceeded, the hub could tear during operation. Here, there is life-threatening danger due to flying parts.

When manufacturing the hub bore, it must be ensured that:

- the hub is precisely aligned,
- the form and positional tolerances in accordance with DIN ISO 286 are adhered to (see figure 7.3).



**Attention!**

Never clamp onto the sealing surface! The operator bears the sole responsibility for the damages that can arise due to defective rework on the unbored / roughly bored coupling parts.

Size	RDZ...DTO		RDZ...DFO			
	Bore d1/d2 [mm]		Bore d1 [mm]		Bore d2 [mm]	
	min.	max.	min.	max.	min.	max.
0010	14	52	14	52	18	60
0015	22	65	22	65	26	80
0020	27	80	27	80	30	90
0025	32	98	32	98	37	110
0030	42	115	42	115	44	130
0035	47	135	47	135	52	150
0040	47	160	47	160	52	180
0045	52	180	52	180	57	200
0050	72	195	72	195	77	220
0055	72	215	72	215	77	240
0060	77	235	77	235	82	260
0070	92	280	92	280	102	300
0080	95	285	95	285	105	335
0090	100	300	100	300	-	370
0100	120	330	120	330	-	405

Table 7.3: Permissible bore diameter

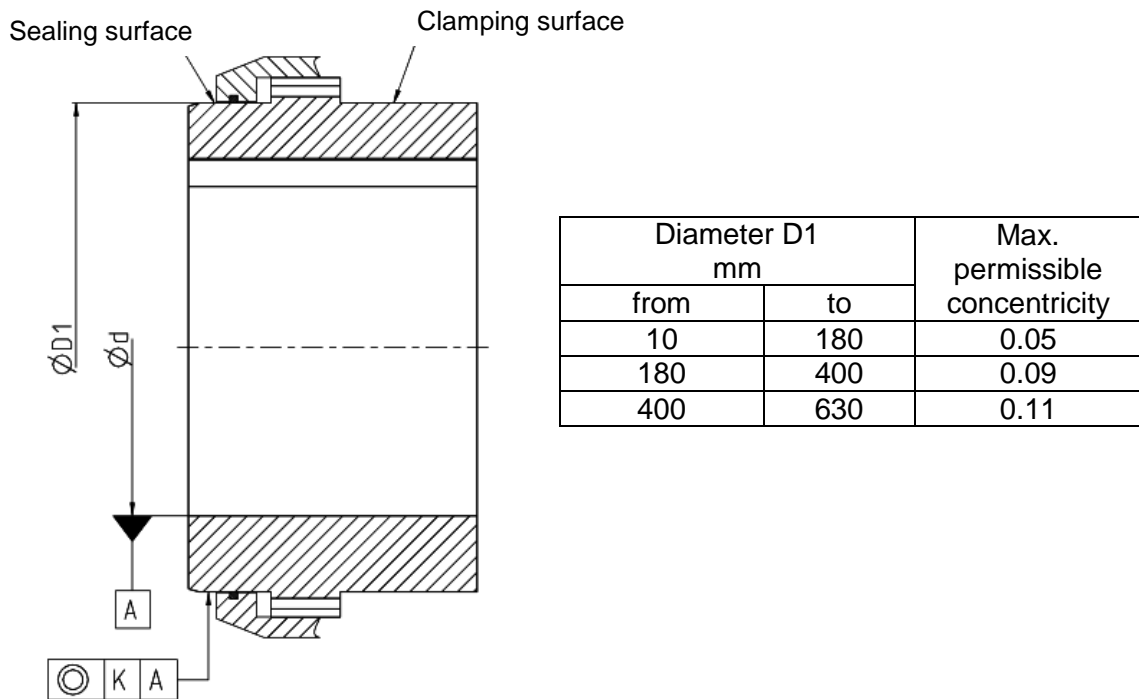


Figure 7.3: Specifications for the form and positional tolerance of the bore

The design and inspection of the keyway connection falls to the operator and is his responsibility.

The gear couplings in the catalogue are designed with bore tolerance H7 and a keyway nut in accordance with DIN 6885, sheet 1. Deviating fits are possible and should be communicated to RINGSPANN as part of any query.


The following fit pairs are recommended:

Type of shaft-hub-connection	Shaft tolerance	Bore tolerance
Transition fit with keyway	h6	P7
	k6	M7
	m6	K7
	n6	J7
	p6	H7
	s6	F7
Shrink fit without keyway	u6	H6
	v6	
	x6	

Table 7.4: Recommended fit pairs

The hub tension should be examined for the fit pair H6 / v6 or x6.

The axial position is normally achieved through the correct fit on the shaft and does not require any additional securing. In the event of a loose fit between shaft and hub or vertical installation, additional measures must be taken to secure the axial position. In such cases, a locking screw in accordance with DIN EN ISO 4029 or a safety washer, for example, could be used. The need for additional axial securing should be communicated to RINGSPANN as part of any query.

	<p><b>Attention!</b> RINGSPANN shall not assume any liability for any resulting damages that arise from work carried out by the operator .</p>
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## 8. Assembly

### 8.1. General assembly instructions

Before beginning with assembly, check for the completeness of the delivery (see chapter 2.3 Parts list) and the dimensional accuracy of the bores, the shaft, the nut and the keyway (see 7. Technical prerequisite for reliable operation).

The parts are to be cleaned of preservative agents, the O-rings may not come into contact with solvents or cleaning agents as a result.

### 8.2. Assembly description

1. Firstly, insert the O-rings (item 8) into the groove of the coupling halves (item 2). To ensure that they don't fall out, you can apply some grease into the groove. Also lubricate the sealing plane surfaces of the coupling halves.
2. Slide the coupling halves (item 2) onto the shaft ends. Ensure hereby that the O-rings (item 8) are not damaged.
3. Mount the hub (item 1) on the input and output side. The shaft end may not protrude out of the hub for normal applications.
  - facilitated sliding onto the shaft can be achieved by heating up the hub (approx. 80°C)
  - the O-rings (item 8) may not touch the heated-up hubs here



**Attention!**

Use suitable means of protection when working with the heated hubs. Touching the heated hubs without safety gloves causes burns.

4. Slide the units in axial direction until the O measure is achieved (see chapter 2.2 Dimensions)
  - if the units are already mounted, the O measure can be adjusted by sliding the hubs onto the shaft. Here, a sufficient supporting length of the keyway must be ensured.
  - if O is not adhered to, the coupling may be damaged.
    - align the hubs (item 1) to one another.
    - the available misalignments should be measured using suitable measuring equipment e.g. dial gauge, straightedge, feeler gauge or depth gauge.
    - the maximum permissible misalignments may not be exceeded.
5. Lightly lubricate the gearing of the coupling halves (item 2) with lubricant and slide on the hubs (item 1).
6. Align the fit bores of coupling halves (item 2 and 9) to one another.
7. Insert the seal (item 6) between coupling halves and screw together the coupling halves with fitting screws, as well as spring washers and nuts and tighten to the specified tightening torque (see table 8.1).

Size	Number of screws	Tightening torque $T_A$ [Nm]
0010	6	6
0015	8	21
0020	6	50
0025	6	97
0030	8	97
0035	8	167
0040	8	167
0045	10	167
0050	8	265
0055	14	265
0060	14	265
0070	16	396
0080	16	334
0090	18	653
0100	18	653

Table 8.1: Number and tightening torque of fitting screws




**Information**

In the event of repeated assembly, it is recommended to replace the seal (item 6), fitting screws (item 3), and spring washers (item 5) and nuts (item 4).

### 8.3. Alignment procedure

9. For simplification, the suitable measurement methods for each type of misalignment will be described. Whereby all misalignment types can occur simultaneously.
10. The remaining misalignments should generally be as small as possible. The size of the misalignments that may occur during assembly are specified in table 8.2.

	<p><b>Attention!</b></p> <p>When putting it into operation, the actual misalignments should be no more than 25% of the max. permissible misalignment values (see chapter 7.2 Permissible misalignments). The remaining 75% of misalignments provide security against external influences that arise during operation, such as deformation in the machine and thermal expansion.</p>
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Size	RDZ...DTO				RDZ...DFO		
	Angular misalignment		Radial misalignment [mm]	Axial misalignment [mm]	Angular misalignment		Axial misalignment [mm]
	Angle per flex. coupling halve [°C]	X [mm]			Angle per flex. coupling halve [°C]	X [mm]	
0010	±0.5°	0.3	0.15	±0.125	±0.5°	0.3	±0.062
0015		0.4	0.20			0.4	
0020		0.5	0.25			0.5	
0025		0.6	0.30			0.6	
0030		0.7	0.35			0.7	
0035		0.8	0.43			0.8	
0040		0.9	0.50	±0.25	0.9	±0.125	
0045		1.0	0.53		1.0		
0050		1.1	0.65		1.1		
0055		1.2	0.73		1.2		
0060		1.3	0.80	±0.5	1.3	±0.25	
0070		1.5	0.93		1.5		
0080		1.7	1.05		1.7		
0090		1.9	1.20		1.9		
0100		2.1	1.38	±0.75	2.1	±0.37	

Table 8.2: Permissible initial offsets

Coupling RDZ...DFO cannot compensate any radial misalignment.

#### 7.3.1 Check the radial misalignment

Measure the radial misalignment by laying a straightedge on both hubs (item 1) and measuring the gap between the hubs with the help of a feeler gauge (see figure 8.1). The straightedge must hereby be aligned with the axis of the hub. This measurement should be repeated multiple times until the point with the largest gap has been found. The size of the gap indicates the radial misalignment at that point. The maximum radial misalignment is given at the point of the largest gap. Alternatively, a depth gauge or dial gauge can also be used.

<b>RINGSPANN</b>	<b>Installation and operating instructions for torsionally stiff gear couplings RDZ...DTO/...DFO</b>			<b>E 06.697</b>	
	As of: 17.02.2023	Version: 01	Signed: RUPD	Checked: SCHW	Number of pages: 26

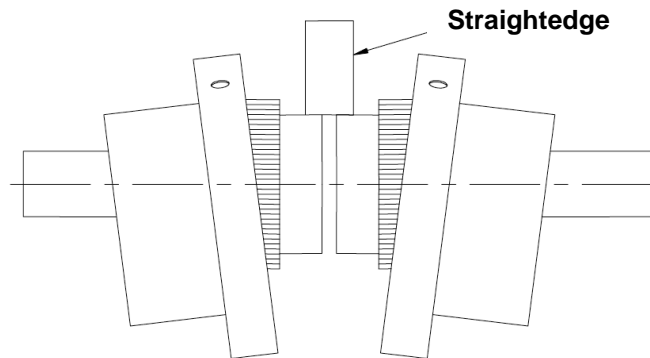


Figure 8.1: Measuring the radial misalignment

### 7.3.2 Check the angular misalignment

Check the angular offset with the help of dial gauges by measuring the axial run-out at the inner plane surface of the hub (item 1). The dial gauge must hereby be positioned as close to the outer diameter as possible. The angular offset 'X' in mm amounts to half of the calculated total value (see figure 8.2). The values of the angular offsets should not exceed the permissible initial offsets specified in table 8.2.

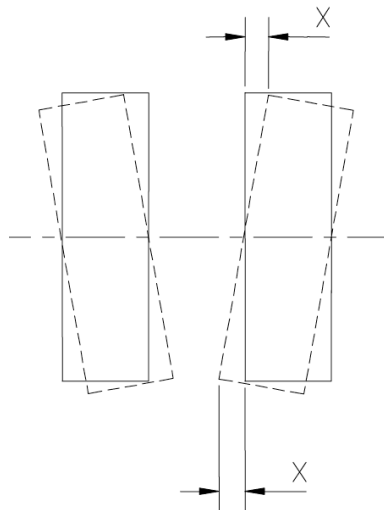


Figure 8.2: Measuring the angular misalignment

## 9. Start-up and lubrication

### 9.1 Start-up

Before putting it into operation for the first time, the following parameters need to be checked:

- the tightening torque of all screws,
- the tightness of the set screws,
- the alignment of the coupling,
- the clearance L.

The operator has the task of mounting a suitable coupling protection to prevent the unintended touching of the coupling during operation. It may only be removed when the machine is at a standstill.

During commissioning, attention must be paid to vibrations and running noises. If any vibrations or unusual running noises should occur, the drive unit must be immediately switched off.



<b>RINGSPANN</b>	<b>Installation and operating instructions for torsionally stiff gear couplings RDZ...DTO/...DFO</b>			<b>E 06.697</b>	
As of: 17.02.2023	Version: 01	Signed: RUPD	Checked: SCHW	Number of pages: 26	Page: 17

## 9.2 Lubrication

The initial filling of the coupling with lubricant is described in the following. Only lubricants that have been approved by RINGSPANN may be used.








<b>Manufacturer</b>			
<b>Lubricant</b>	<b>CERAN MS</b>	<b>MOBILGREASE XTC</b>	<b>RAVENOL Amber Getriebefließfett</b>
<b>Manufacturer</b>			
<b>Lubricant</b>	<b>Mobilux EP 111</b>	<b>GRAFLOSCON C-SG 0 ULTRA, C-SG 1000 ULTRA</b>	<b>CENTOPLEX GLP 500</b>

Table 9.1 Lubricants approved by RINGSPANN

Before filling the coupling with lubricant, the quantity must be measured in accordance with table 9.2. After assembly of the flexible coupling half, the lubricant should be applied in the cavity between the hub (item 1) and the flexible coupling half (item 2). This approach should be carried out for all flexible coupling halves. Afterwards, seal (item 6) should be inserted and the two halves should be screwed together via fitting screws. Excess lubricant must be completely collected and disposed of in an environmentally friendly manner.

<b>Size</b>	<b>RDZ...DTO Lubricant quantity [kg]</b>	<b>RDZ...DFO Lubricant quantity [kg]</b>
0010	0.03	0.015
0015	0.06	0.03
0020	0.17	0.085
0025	0.23	0.115
0030	0.34	0.17
0035	0.45	0.225
0040	0.79	0.395
0045	1.08	0.540
0050	1.59	0.795
0055	1.93	0.965
0060	3.46	1.73
0070	6.35	3.175
0080	9.6	4.8
0090	13.3	6.65
0100	17.3	8.65

Table 9.2: Lubricant quantity

	<p><b>Attention!</b> You may not mix different lubricants. The lubricant must be replaced after 6 months.</p>
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To replace the lubricant, we recommend disassembling the flexible coupling halves and thoroughly cleaning all parts. The re-filling with lubricant should then subsequently take place as described above.

<b>RINGSPANN</b>	<b>Installation and operating instructions for torsionally stiff gear couplings RDZ...DTO/...DFO</b>			<b>E 06.697</b>	
As of: 17.02.2023	Version: 01	Signed: RUPD	Checked: SCHW	Number of pages: 26	Page: 18

## 10. Operational disturbances

The possible operational disturbances are listed in the following table. In order to remedy them, **first bring the unit to a standstill** and then follow the further instructions in the column "Remedy". This table only provides a starting point for the search for the cause. All neighbouring components should also be subjected to an examination.

<b>Disturbances</b>	<b>Causes</b>	<b>Remedy</b>
Changes in sounds or vibrations	Alignment error	<ol style="list-style-type: none"> <li>1) Eliminate the cause of the alignment error</li> <li>2) Carry out wear inspection</li> <li>3) Re-align the coupling</li> </ol>
	Lack of lubricant	<ol style="list-style-type: none"> <li>1) Carry out wear inspection</li> <li>2) Replace lubricant</li> <li>3) Check seals and replace if necessary</li> </ol>
Impermissible gearing wear	Vibrations in the drivetrain	<ol style="list-style-type: none"> <li>1) Disassemble coupling</li> <li>2) Replace damaged parts</li> <li>3) Find and eliminate cause for the vibrations</li> <li>4) Align coupling</li> </ol>
	Misalignment is outside the permissible range	<ol style="list-style-type: none"> <li>1) Disassemble coupling and examine</li> <li>2) Replace worn parts</li> <li>3) Check alignment and correct if necessary</li> </ol>
	Lack of lubricant	<ol style="list-style-type: none"> <li>4) Carry out wear inspection</li> <li>5) Replace lubricant</li> <li>6) Check seals and replace if necessary</li> </ol>
Untightness / lubricant leaks out	O-rings worn	<ol style="list-style-type: none"> <li>1) Carry out wear inspection</li> <li>2) Clean coupling</li> <li>3) Replace O-rings</li> <li>4) Fill with lubricant</li> </ol>
	O-ring porous due to false storage or damaged during assembly	<ol style="list-style-type: none"> <li>1) Carry out wear inspection</li> <li>2) Clean coupling</li> <li>3) Optimise storage and eliminate the reason for assembly errors</li> <li>4) Replace O-rings</li> <li>5) Fill with lubricant</li> </ol>
	O-rings damaged due to contact with aggressive media, ozone or hot surfaces	<ol style="list-style-type: none"> <li>1) Carry out wear inspection</li> <li>2) Clean coupling</li> <li>3) Eliminate negative influences</li> <li>4) Replace O-rings</li> <li>5) Fill with lubricant</li> </ol>
Gearing or coupling halve break	Break due to overload	<ol style="list-style-type: none"> <li>1) Disassemble coupling</li> <li>2) Replace damaged parts</li> <li>3) Eliminate cause for the overload</li> <li>4) Align coupling</li> </ol>

<b>RINGSPANN</b>	<b>Installation and operating instructions for torsionally stiff gear couplings RDZ...DTO/...DFO</b>				<b>E 06.697</b>	
As of: 17.02.2023	Version: 01	Signed: RUPD	Checked: SCHW	Number of pages: 26	Page: 19	

	The coupling selected was too weak	1) Disassemble coupling 2) Check the design of the coupling 3) Install, align and lubricate larger coupling
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Table 10.1: Operational disturbances

## 11. Maintenance and repair

### 11.1 General maintenance work

The coupling must be regularly inspected and relubricated. The scope of the inspection includes:

- examining the coupling alignment,
- examining the coupling for damages,
- examining the screw connections,
- checking the tightness,
- check the torsional backlash.

The tightening torques of the screws must be examined at regular intervals.

To ensure that the coupling can be safely operated, the specified wear values may not be exceeded. The wear due to torsional backlash is measured for the gear coupling.

Size	0010	0015	0020	0025	0030	0035	0040	0045
Torsional backlash $X_{\max}$ [mm]	1.0	1.0	1.0	1.5	1.5	1.5	2.0	2.0

Size	0050	0055	0060	0070	0080	0090	0100
Torsional backlash $X_{\max}$ [mm]	2.0	2.5	2.5	2.5	3.0	4.0	4.0

Table 11.1: Wear limit per hub

The inspection of these wear values is to be carried out as follows:

- Turn hub (item 1) in one direction of rotation
- Make a marking on the hub (item 1) and coupling half (item 2) as shown in figure 11.1 (a)
- Turn the hub (item 1) in the other direction of rotation until stop
- The markings move apart
- Measure the distance  $X_{\max}$  (see figure.1 (b)) between the markings and compare with table 11.1
- If value  $X_{\max}$  is reached, the coupling needs to be replaced.

<b>RINGSPANN</b>	<b>Installation and operating instructions for torsionally stiff gear couplings RDZ...DTO/...DFO</b>			<b>E 06.697</b>	
As of: 17.02.2023	Version: 01	Signed: RUPD	Checked: SCHW	Number of pages: 26	Page: 20



**Attention!**

The wear measurement needs to be carried out on both coupling halves for coupling RDZ...DTO.

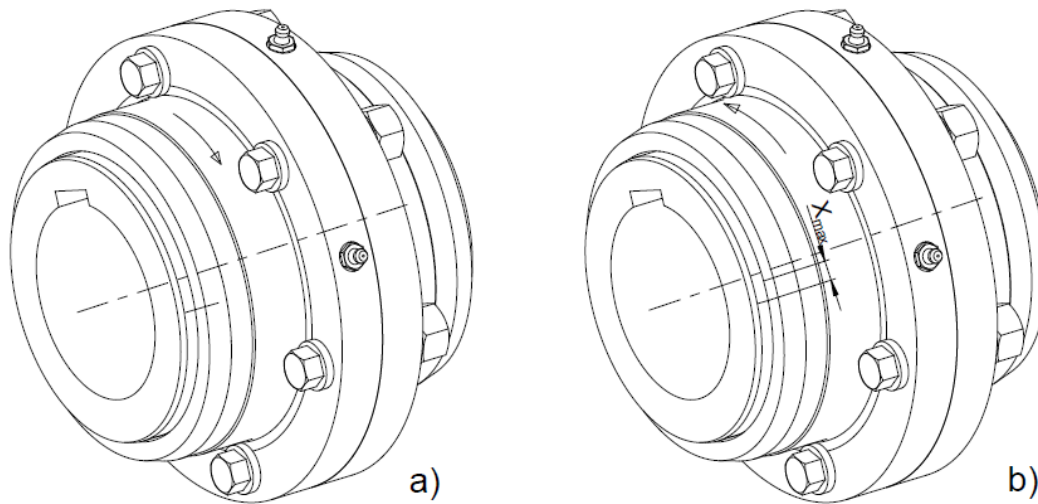


Figure 11.1: Checking the wear limit

## 11.2 Changing the lubricant

To ensure reliable operation of the coupling, the lubricant should be changed regularly. The following must be observed:

- - The prescribed grease quantities must be observed
- - The used grease must be collected completely and disposed of in accordance with the applicable regulations.
- - The grease manufacturer's instructions must be observed.

The lubricant change intervals depend on the operating conditions such as ambient temperature, shaft misalignment, speed, load and operating duration. In general, the following intervals are recommended:

Operating temperature < 70°C: approx. 8,000 operating hours, but after 24 months at the latest.

Operating temperature > 70°C: approx. 3,000 operating hours after 12 months at the latest.

The residual quantity in the coupling should be as small as possible. When changing the lubricant manufacturer, the compatibility with the old grease should be confirmed.

## 12. Spare part stockpiling

In order to keep disturbances in operation to a minimum, it is advisable to keep a stock of spare parts directly at the deployment site in order to be able to guarantee optimal operational capability.

<b>RINGSPANN</b>	<b>Installation and operating instructions for torsionally stiff gear couplings RDZ...DTO/...DFO</b>			<b>E 06.697</b>	
As of: 17.02.2023	Version: 01	Signed: RUPD	Checked: SCHW	Number of pages: 26	Page: 21



**Attention !**

RINGSPANN shall not assume any liability for any occurring damages if spare parts from other manufacturers are used.

### 13. Disposal

At the end of its operating life:

- plastics must be disposed of via a disposal company,
- metals must be cleaned and disposed of properly with other scrap metal,
- dispose of the lubricant under observation of the applicable provisions

Please also properly dispose of the packaging.

<b>RINGSPANN</b>	<b>Installation and operating instructions for torsionally stiff gear couplings RDZ...DTO/...DFO</b>			<b>E 06.697</b>	
As of: 17.02.2023	Version: 01	Signed: RUPD	Checked: SCHW	Number of pages: 26	Page: 22

## 14. Supplement for operation in areas with potentially explosive atmosphere

### 14.1. Normal operation

The gear coupling is manufactured in the types RDZ...DTO / ...DFO. The individual types are described in the shaft couplings catalogue. The operator's design of the gear coupling must be carried out according to the method specified in the catalogue under Technical notes – Coupling design. The design limits (max. torque, max. speed, max. misalignment, ambient conditions) according to the shaft coupling catalogue must be observed. For the operator's calculation of the vibration behaviour of the overall system, the moment of inertia of the gear coupling is specified. The gear coupling must not be operated within the range of natural vibrations.

The specifications in the installation and operating instructions must be observed.

Hubs and coupling halves are made of steel as standard. The bores can be supplied finished or pre-drilled in a specified dimensional range. Geometric dimensioning and tolerancing are provided for the user's finish bore.

The shaft/hub fit must be selected by the user in such a way that a tight fit of the hub is guaranteed. In case of a clearance fit, axial securing must be provided. Recommendations and alternatives are provided.

The design of the shaft extensions and keyway connection is the responsibility of the user.

A clearance of "O" between the hubs must be observed.

The resistance of the materials used to the surrounding atmosphere must be assessed by the operator.

The gear coupling is a device in the sense of Directive 2014/34/EU and may only be used in or in connection with potentially explosive atmospheres if the following instructions are observed.

#### 14.1.1. Ambient conditions

Ambient pressure $p_U$	0.8 to 1.1	bar
Ambient temperature $T_a$	-20 to +280	°C
Oxygen content $x_{O_2}$	approx. 21	vol. %

It should be noted that Directive 2014/34/EU does not apply to explosives or chemically unstable hazardous substances or mixtures.

#### 14.1.2. Explosive atmosphere in category I

In the installation room, explosive atmospheres caused by mine gas (methane) and coal dust are taken into account:

Gas	Methane (gas group IIA)
Dust	Coal dust (dust group IIIC)

#### 14.1.3. Explosive atmosphere in category II

In the installation room, explosive atmospheres caused by gases/vapours or dusts with the following properties are taken into account:

Assessment	Zone 1 or 2
Gas group	IIA and/or IIB and/or IIC
Assessment	Zone 21 or 22
Dust group	IIIA and/or IIIB and/or IIIC

Exceptions are dusts with a minimum ignition energy <1 mJ, such as sulphur.

<b>RINGSPANN</b>	<b>Installation and operating instructions for torsionally stiff gear couplings RDZ...DTO/...DFO</b>			<b>E 06.697</b>	
As of: 17.02.2023	Version: 01	Signed: RUPD	Checked: SCHW	Number of pages: 26	Page: 23

#### 14.1.4. Possible misuse

A possible misuse in the sense of the manufacturer's definition is the operation in connection with atmospheres not explicitly mentioned in section 1.2 or 1.3.

Likewise, the ambient conditions according to section 1.1 must not be exceeded.


It is assumed that the gear coupling is maintained by competent personnel who have been instructed in the explosion hazards associated with the gear coupling.

#### 14.1.5. Instructions for use


The gear coupling is designed to be ignition source-free according to DIN EN ISO 80079-36:2016 and DIN EN ISO 80079-38:2017 in accordance with the marked category.

The maximum surface temperature results from the actual ambient temperature  $T_a$  according to the following device labelling.


In device group I:

CE  I M2 Ex h Mb  
 $-20\text{ °C} < T_a < +100\text{ °C}$

In device group II for all gas groups:

CE  II 2G Ex h IIC T6/T5/T4 Gb.  
 $-20\text{ °C} < T_a < +80/95/100\text{ °C}$

In device group II for all dust groups:

CE  II 2D Ex h IIIC T85/T100/T105°C Db.  
 $-20\text{ °C} < T_a < +80/95/100\text{ °C}$

The following measures must be observed to avoid ignition sources in addition to the standard installation and operating instructions:

- The gear coupling may not circulate in an accumulation of dust.
- Only the specified lubricants may be used. The relubrication intervals specified in the installation and operating instructions must be observed.
- The gear coupling must be checked regularly for wear. The gear coupling must be replaced before the permissible torsional backlash is reached. The intervals specified in the installation and operating instructions must be observed.
- All screw connections are to be secured with the specified tightening torque.
- The hubs must be secured on the shaft ends by means of a shrink connection or set screw against axial displacement.
- The integration of the connected machines in the equipotential bonding of the system must be carried out in accordance with DIN EN 60204-1.
- The gear coupling must be secured against contact/impact by means of a separating protective device. Openings or gaps in/with the separating guards must be at least IP 2X according to IEC 60529. In group I, the guard shall be capable of withstanding severe operating conditions.

In accordance with the marking, the gear coupling does not possess any other effective ignition sources of their own. External ignition sources (e.g. heating, lightning, ionising radiation, short and long waves, ultrasound, shock waves) must be evaluated on the system side.

<b>RINGSPANN</b>	<b>Installation and operating instructions for torsionally stiff gear couplings RDZ...DTO/...DFO</b>			<b>E 06.697</b>	
As of: 17.02.2023	Version: 01	Signed: RUPD	Checked: SCHW	Number of pages: 26	Page: 24

## 14.2. Instructions on occupational health and safety



If the gear coupling is used as a component of a device or an assembly group in the sense of Directive 2014/34/EU, the device manufacturer must establish and confirm the compliance of this device or assembly group with the specified directive before commissioning.

If the gear coupling is used as a part of a facility, the operator of the facility must adhere to the requirements of Directive 1999/92/EC and if necessary national requirements that go beyond it.

It is the operator's responsibility to review whether the gear coupling is suitable for operation in the actual given explosive atmosphere based on the instructions for use.

The gear coupling does not exhibit any effective ignition sources in disturbance-free operation. Disturbance-free operation must be ensured by the operator through inspection, maintenance and repair in accordance with the information in the installation and operating instructions.

An improperly functioning the gear coupling must be brought to a standstill by the operator. The gear coupling may only put back into operation after repair.

No burning, welding or cutting works are required for maintenance and repair.

When working in an explosive atmosphere, e.g. to loosen a shrink joint, the operator must take protective measures in accordance with Directive 1999/92/EC, e.g. in accordance with DIN EN 1127-1 appendix A. Smoking, fire and naked flames must be prohibited.

## 14.3. Setup and assembly



The hubs must be secured against axial displacement on the shaft extension with a a shrink joint or locking screw, see installation and operating instructions.

All screws must be tightened with the specified torque.



<b>RINGSPANN</b>	<b>Installation and operating instructions for torsionally stiff gear couplings RDZ...DTO/...DFO</b>			<b>E 06.697</b>	
As of: 17.02.2023	Version: 01	Signed: RUPD	Checked: SCHW	Number of pages: 26	Page: 25

#### 14.4. Control, inspection and repair



To prevent and recognise disturbances, the following instructions must be observed in addition to the inspection instructions in the installation and operating instructions.

Disturbances must be eliminated immediately under observation of the repair information.

In daily inspections, attention must be paid to changes in running noises that should arise.

The gear coupling must be checked regularly for corrosion, abrasion and breakage of individual discs in accordance with the installation and operating instructions. The gear coupling must be replaced before unacceptable wear or breakage is detected.

To preserve the explosion protection concept, only spare parts specified by the manufacturer may be used.

#### 14.5. Testing



The gear coupling is to be examined in accordance with Directive 1999/92/EC before commissioning for correct assembly and proper function by a specialist or by RINGSPANN or an authorised RINGSPANN representative. This test must be documented.

The gear coupling must at the latest every 3 years be checked for proper function by a specialist or by RINGSPANN or an authorised RINGSPANN representative in accordance with Directive 1999/92/EC. This test must be documented.

Furthermore, tests must be carried out in accordance with the applicable national regulations.

<b>RINGSPANN</b>	<b>Installation and operating instructions for torsionally stiff gear couplings RDZ...DTO/...DFO</b>			<b>E 06.697</b>	
As of: 17.02.2023	Version: 01	Signed: RUPD	Checked: SCHW	Number of pages: 26	Page: 26

**15. Declaration of Conformity according to Directive 2014/34/EU**

**EU Declaration of Conformity**

in the sense of the Explosion Protection Directive 2014/34/EU

It is hereby declared that: RINGSPANN GmbH  
Schaberweg 30-38  
61348 Bad Homburg

is solely responsible for ensuring that the device described in the installation and operating instructions

Device: Gear coupling RDZ...DTO / ...DFO

meets the basic health and safety requirements of Directive 2014/34/EU, Annex II. The possible applications are shown in the labelling and the instructions for use in section 14 "Supplement for operation in areas with potentially explosive atmosphere" of the installation and operating instructions E 06.697.

The following harmonised standards and/or normative documents were fully or partially taken into account in the design and manufacture of this device:

European standards	National standards / normative documents
DIN EN 1127-1 :2019 DIN EN 15198 :2007 DIN EN ISO 80079-36 :2016 DIN EN ISO 80079-38 :2017 DIN EN ISO 80079-37 :2016	

The special instructions for operation in section 14 "Supplement for operation in areas with potentially explosive atmosphere" of the installation and operating instructions E 06.697 must be observed.

The technical documentation according to Annex VIII, No. 3 has been prepared and stored with notified body 0044. The storage number is 35307124.



Bad Homburg, 25.10.2021

p. p. Ernst Fritze  
Technical Manager

on behalf of Martin Schneeweis  
Product Manager