

Installation and operating instructions for torsionally stiff disc couplings RDL...DSO/...DSZ/...DSA

E 06.699e



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RINGSPANN	Installation and operating instructions for torsionally stiff disc couplings RDL...DSO/...DSZ/...DSA			E 06.699	
As of: 01.11.2021	Version: 02	Signed: SCHW	Checked: EISF	Number of pages: 28	Page: 2

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.

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.

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1. General information

1.1. Function

The main task of the torsionally stiff disc coupling consists in transferring the torque of one shaft end onto another element. Additionally, the coupling should compensate angular and axial misalignments. The RDL...DSZ/...DSA type disc couplings can compensate also radial 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. The specified transmissible torques solely apply to the disc pack.

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

Type RDL...DSO/...DSZ/...DSA 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

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2.2. Dimensions

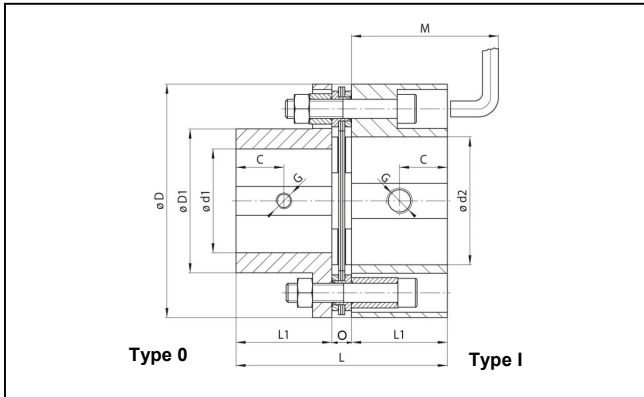


Figure 2.1: Drawing RDL...DSO

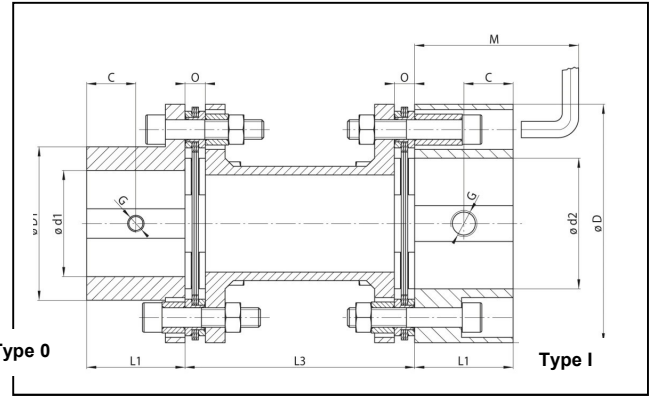


Figure 2.2: Drawing RDL...DSZ

Size	D mm	D1 mm	C mm	L mm	L1 mm	M* mm	O mm	Weight with max. bore kg
0024	63	35	15.0	66.5	30	75	6.5	0.87
0038	82	45	20.0	86.5	40	85	6.5	1.80
0048	102	57	22.5	98.0	45	95	8.0	3.20
0065	128	77	27.5	119.5	55	110	9.5	5.83
0075	146	94	30.0	132.0	60	120	12.0	8.40
0100	176	115	35.0	153.0	70	140	13.0	14.10
0110	197	132	45.0	194.4	90	175	14.4	22.10
0125	225	147	47.5	206.2	95	185	16.2	30.70
0140	250	162	52.5	229.5	105	195	19.5	42.80
0150	275	178	57.5	251.5	115	215	21.5	57.60
0160	300	190	65.0	283.5	130	235	23.5	76.20

Table 2.1: Dimensions RDL...DSO

Size	D mm	D1 mm	C mm	L1 mm	Standard DBSE (L3)		M* mm	O mm	Weight with standard DBSE (L3)	
					shortest possible mm	standard mm			with shortest standard kg	each extra metre to standard kg
0024	63	35	15.0	30	55	100 140	75	6.5	4.5	2.3
0038	82	45	20.0	40	57	100 140 180	85	6.5	9.5	3.2
0048	102	57	22.5	45	82		95	8.0	15.5	3.2
0065	128	77	27.5	55	89	140 180	110	9.5	27.5	7.0
0075	146	94	30.0	60	108		120	12.0	41.5	8.4
0100	176	115	35.0	70	114	180 250	140	13.0	67.0	13.1
0110	197	132	45.0	90	126		175	14.4	100.0	21.7
0125	225	147	47.5	95	143	180 250 300	185	16.2	135.0	21.7
0140	250	162	52.5	105	168		195	19.5	195.0	27.1
0150	275	178	57.5	115	180	215	21.5	261.0	42.8	
0160	300	190	65.0	130	180	235	23.5	316.0	42.8	

* Distance M is required to tighten and loosen the screws with hub type I

Table 2.2: Dimensions RDL...DSZ

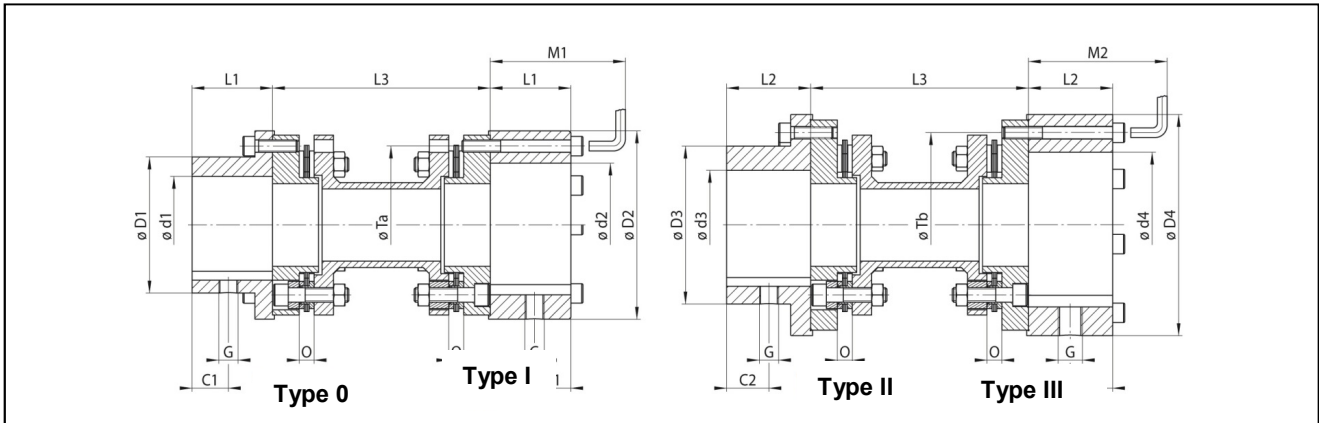


Figure 2.3: Drawing RDL...DSA, design in accordance with API 610

Size	D1 mm	D2 mm	D3 mm	D4 mm	C1 mm	C2 mm	L1 mm	L2 mm	Standard DBSE (L3)		M1 mm	M2 mm	O mm	Weight with standard DBSE (L3)		
									Min. mm	standard mm				with shortest standard kg	each extra metre to standard kg	
0024	40	69	55	90	15	20	30	40	65	100	80	90	7.5	2	1.3	
0038	55	90	70	108	20	22.5	40	45	71	140	90	105	7.5	3.76	2.41	
0048	70	108	86	135	23	27.5	45	55	95	180	105	120	8.5	6	2.7	
0065	86	135	108	152	28	30	55	60	107	140	120	125	9.2	11.1	7	
0075	108	152	130	182	30	35	60	70	129	180	125	135	12.4	17	8.4	
0100	130	182	158	197	35	45	70	90	142	180	135	155	10.6	28.4	13.1	
0110	158	197	181	225	45	47.5	90	95	153		250	155	160	13.9	38.3	12.82
0125	181	225	206	250	48	52.5	95	105	156	180	160	170	14.5	53.18	19.21	
0140	206	250	223	275	53	57.5	105	115	169		250	170	190	15.9	74.4	27.1
0150	223	275	248	300	58	65	115	130	188		300	190	215	17.4	98.63	34.6
0160	248	300	280	375	65	72.5	130	145	202		215	245	18.3	128.1	42.8	

* Distance M1 and M2 is required to tighten and loosen the screws with hub type I and II

Table 2.3: Dimensions RDL...DSA, design in accordance with API 610

Attention!
With special designs, the dimensions drawing that was created for it primarily applies. It should be made available to the operator.

2.3. Parts list

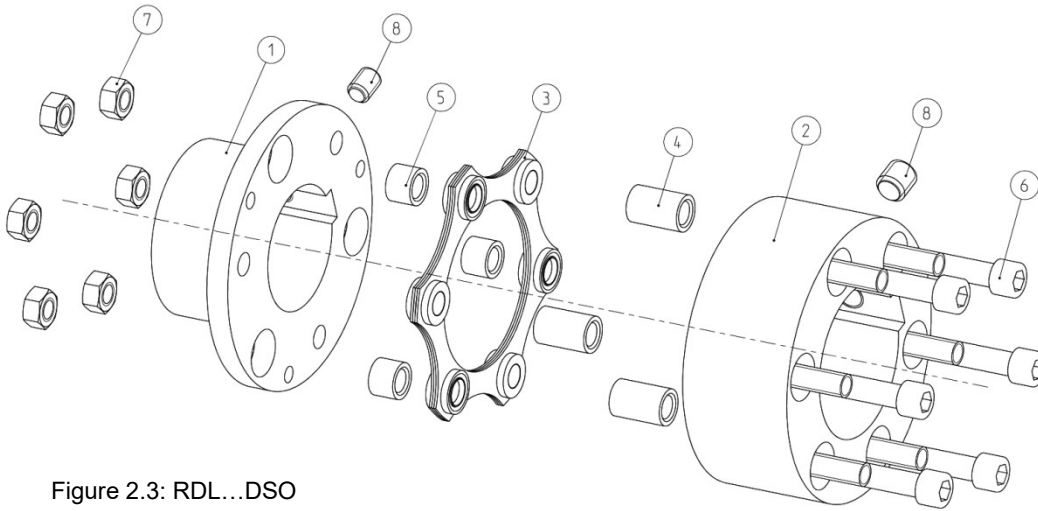


Figure 2.3: RDL...DSO

Position	Quantity	Description
1	1	Hub type 0 / type I
2	1	Hub type 0 / type I
3	1	Disc pack
4	Size dependent	Spacer sleeve short / long
5	Size dependent	Spacer sleeve short / long
6	Size dependent	Cylinder screw
7	Size dependent	Self-locking nut
8	1	Locking screw

Table 2.3: Parts list RDL...DSO

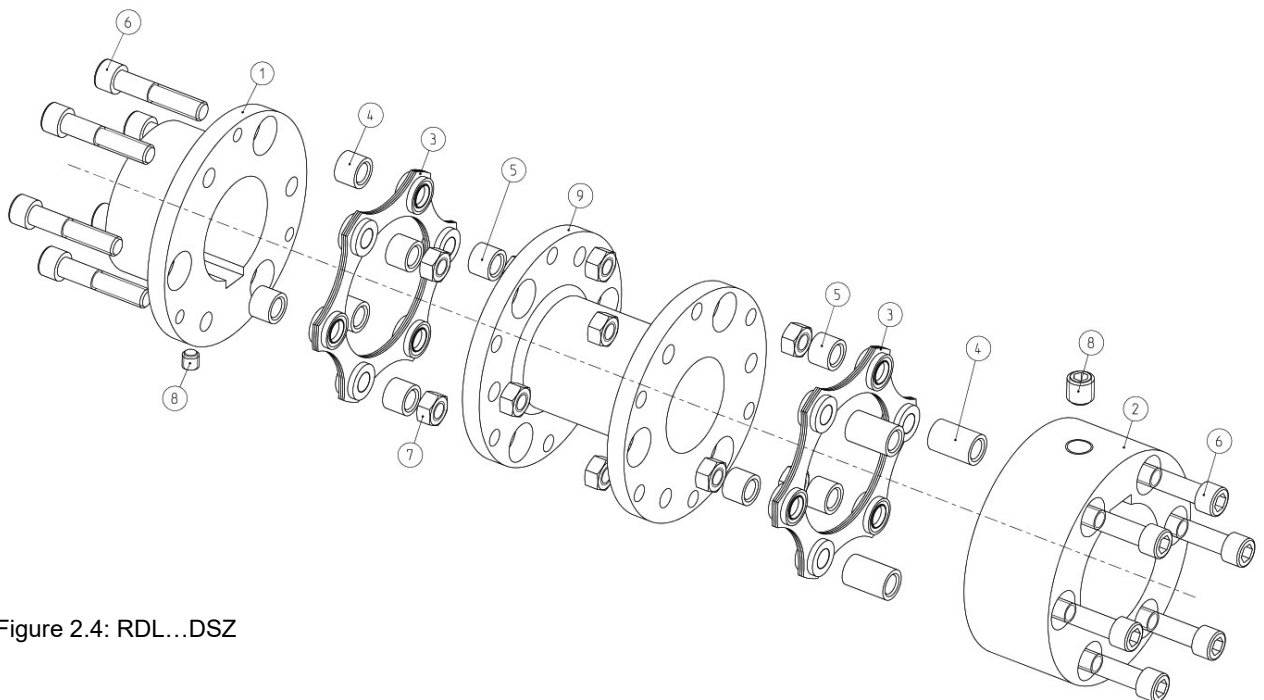


Figure 2.4: RDL...DSZ

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Position	Quantity	Description
1	1	Hub type 0 / type I
2	1	Hub type 0 / type I
3	2	Disc pack
4	Size dependent	Spacer sleeve short / long
5	Size dependent	Spacer sleeve short
6	Size dependent	Cylinder screw
7	Size dependent	Self-locking nut
8	2	Locking screw
9	1	Spacer

Table 2.4: Parts list RDL...DSZ

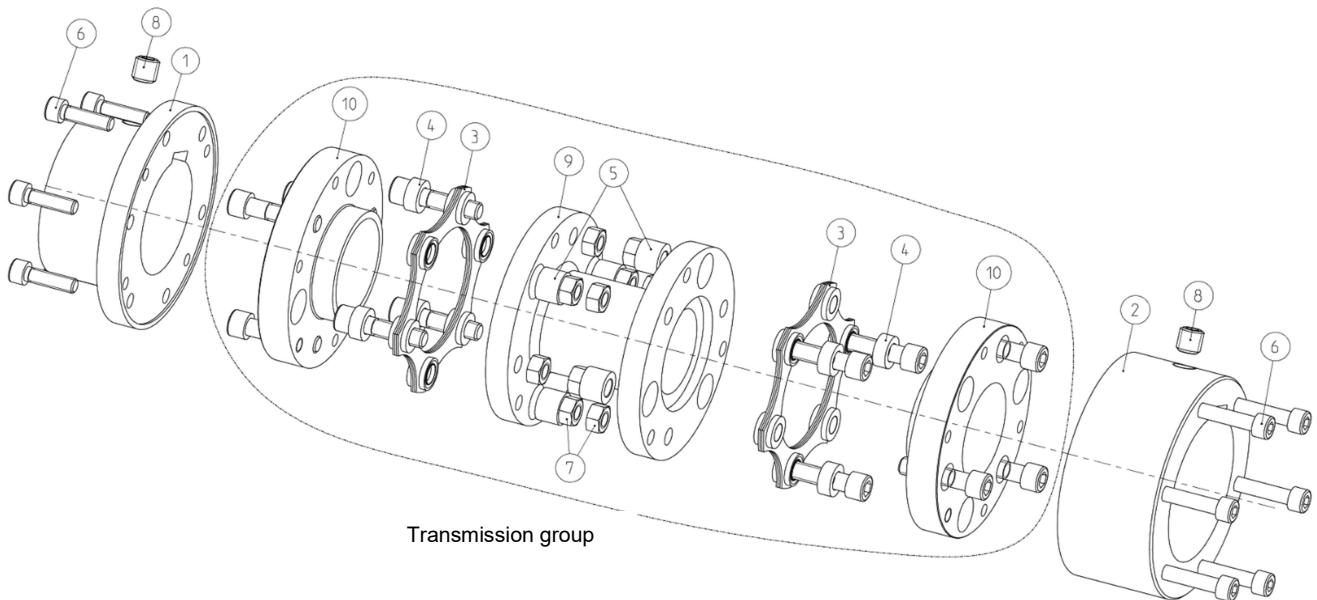


Figure 2.5: RDL...DSA

Position	Quantity	Description
1	1	Hub type 0 / type I / type II / type III
2	1	Hub type 0 / type I / type II / type III
3	2	Disc pack
4	Size dependent	Spacer sleeve short
5	Size dependent	Spacer sleeve long
6	Size dependent	Cylinder screw
7	Size dependent	Self-locking nut
8	2	Locking screw
9	1	Spacer
10	2	Intermediate flange

Table 2.5: Parts list RDL...DSA

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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 RDL...DSO, ...DSZ, ...DSA 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
- components have been mixed up or falsely mounted,
- a wrong disc pack or no disc pack is mounted,
- the maintenance intervals are not observed.

The further operation of coupling type RDL...DSO / ...DSZ / ...DSA is not permissible under the following conditions:

- if the permissible limits of use (torque, speed, permissible misalignments, ...) 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>Attention! RINGSPANN shall not assume any liability for any damages that result in the event of any impermissible use.</p>
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5. Condition as delivered

The couplings are generally delivered fully mounted and heaved. 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. All components are deliv-

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ered 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.

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

- have a roof and are dry,
- 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	RDL...DSO RDL...DSZ RDL...DSA		RDL... DSO	RDL... DSZ	RDL... DSA
	Nominal torque T_{KN} Nm	Max. speed n_{max} min^{-1}	Torsional stiffness C_T MNm/rad	Torsional stiffness C_T MNm/rad	Torsional stiffness C_T MNm/rad
024	96	7500	0.043	0.031	0.030
038	232	7000	0.062	0.025	0.025
048	620	6000	0.118	0.040	0.040
065	1200	5200	0.260	0.099	0.095
075	1910	4800	0.492	0.176	0.170
100	3460	4400	1.228	0.305	0.300
110	5600	4200	1.926	0.432	0.430
125	7100	4000	3.613	0.600	0.600
140	10400	3800	upon request	0.800	0.800
150	14500	3700		1.500	1.100
160	18700	3600		1.400	1.500

*Torsional stiffness applies, unless otherwise specified, to a combination of hub type 0 and hub type I with the respective max. possible bore diameter and if necessary shortest standard DBSE (L3).

Table 7.1: Permissible operating parameters

7.2. Permissible misalignments

Size	Max. permissible misalignments RDL...DSO RDL...DSZ RDL...DSA		Max. permissible misalignments RDL...DSZ / RDL...DSA
	Axial [mm]	Angle for each disc pack ΔK_w [°]	Radial ΔK_r [mm]
024	±1	0.75	L3 x 0.013
038			
048			
065			
075			
100	±2	0.75	L3 x 0.013
110			
125			
140			
150			
160			

** Values apply to a misalignment angle of 0.5° per hub and smallest standard DBSE (L3). Greater misalignments are permissible with larger standards DBSE (L3).

Table 7.2: Maximum permissible misalignments

The maximum permissible misalignment values (table 7.2) must be adhered to and may not oc-

cur at the same time. In the event of the simultaneous occurrence of radial and angular offset, misalignments need to be exploited differently percentage-wise (see figure 7.2). If not observed, damage to the coupling may result.

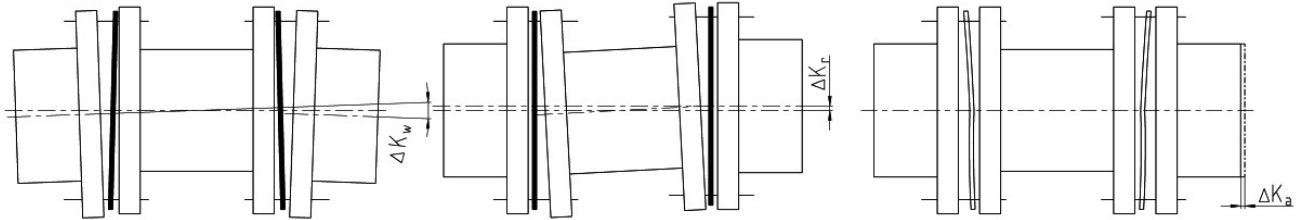


Figure 7.2: Misalignment types

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

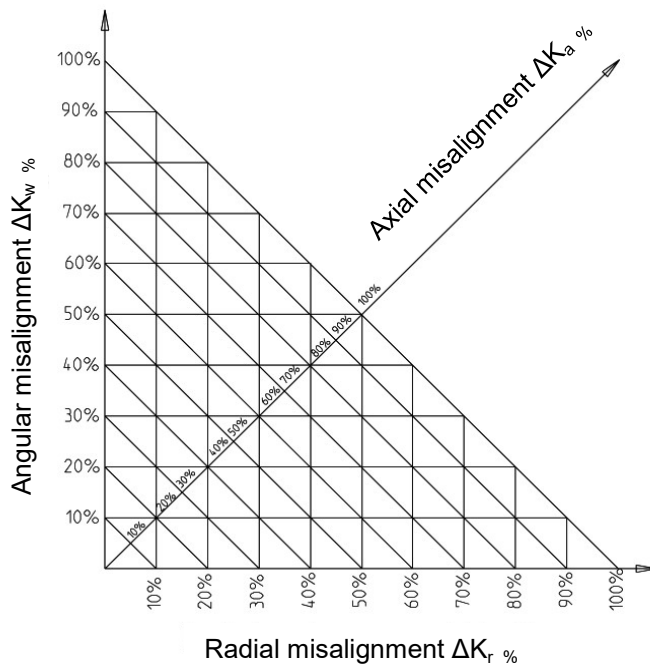



Figure 7.2: Misalignment combination

The misalignment as a percentage is calculated as follows:

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

7.3. Manufacturing the hub bore

If the coupling was supplied with a rough bore, the bore and the keyway must be manufactured. For this, the hubs (items 1 and 2) must be disassembled by removing the cylinder screws.

	<p>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.</p>
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When manufacturing the hub bore, it must be ensured that:

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

Size	RDL...DSO/...DSZ		RDL...DSA			
	Hub type 0	Hub type I	Hub type 0	Hub type I	Hub type II	Hub type III
	max. d1 [mm]	max. d2 [mm]	max. d1 [mm]	max. d2 [mm]	max. d3 [mm]	max. d4 [mm]
024	22	25	24	42	38	48
038	30	38	38	48	48	72
048	40	50	48	72	65	92
065	52	70	65	92	80	102
075	65	80	80	102	90	120
100	80	100	90	120	108	140
110	90	115	108	140	127	155
125	105	130	127	155	140	178
140	115	140	140	178	155	192
150	120	155	155	192	170	212
160	135	165	170	212	190	255

Table 7.3: Max. permissible bore diameter

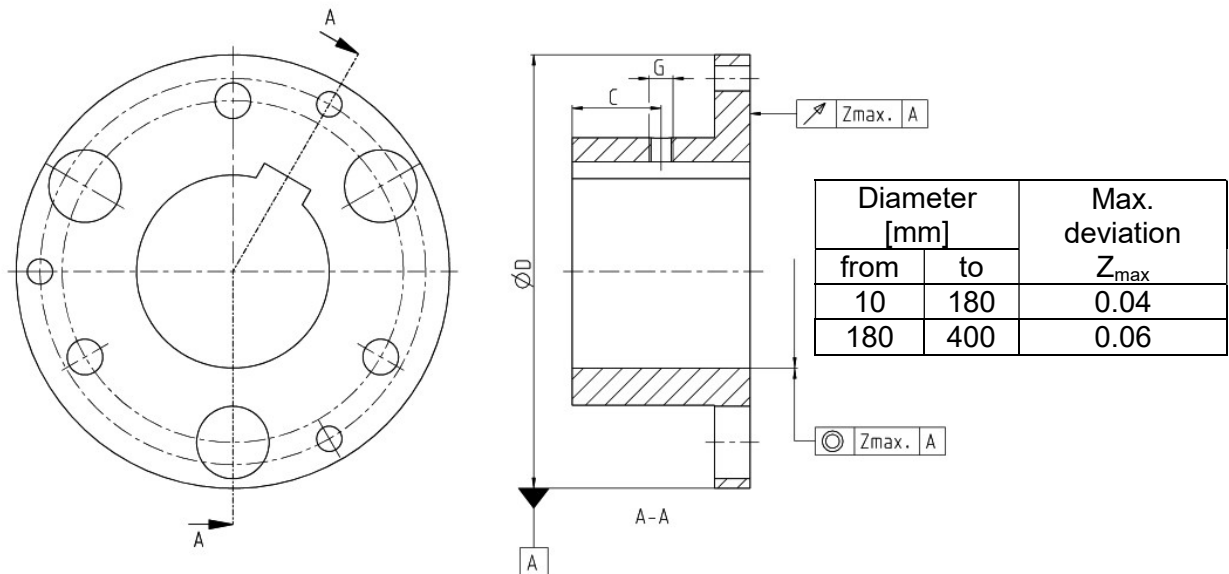


Figure 7.3: Specifications for the form and positional tolerance of the bore

If the hub is to be designed with a keyway, it is preferably to be introduced between the bores as shown in figure 7.3. In this version, a tapped hole is recommended for the axial securing of the hubs. Measure C should correspond to half the hub length where possible. The dimensions of the tapped hole G and the tightening torques of the locking screw can be found in table 7.5.

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

The disc couplings in the catalogue are designed with bore tolerance H7 and a keyway 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:

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Bore [mm]	Shaft tolerance	Bore tolerance
≤ 50	k6	H7
> 50	m6	

Table 7.4: Recommended fit pairs

Locking screws in accordance with DIN EN ISO 4029 should be used for axial securing. Here the following applies:

Bore d1/d2 [mm]	from	9	22	38	58	75	110	260
	to	22	38	58	75	110	260	500
Size locking screw		M5	M6	M10	M12	M16	M20	M24
Tightening torque [Nm]		2	4	17	40	80	140	220

Table 7.5: Size and tightening torques of the locking screws


	Locking screws in accordance with DIN EN ISO 4029 should be used for axial securing. Here the following applies:
--	--

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).

Loosen and remove the screws and sleeves marked in red that serve as transport locking.

	Information! With spacers that are smaller than the smallest standard length, the transport locking can possibly be omitted.
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The parts are to be cleaned of preservative agents.

Disassemble the hubs (items 1 and 2) by removing all cylinder screws (item 6). The transmission group with disc couplings RDL...DSA may not be dismantled.

8.2. Assembly of the hubs.

- Mount the hubs (items 1 and 2) onto the shaft ends. 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)
 - if necessary, the shafts can protrude max. 1 mm out of the hub for each side or remain inside.
- For hub types I and III, distances M/M1/M2 (table 2.1 to 2.4) must be adhered to. Measure M/M1/M2 is required to tighten and loosen the screws.
- Slide the units in axial direction until the O / L3 measure is achieved (see chapter 2.2 Dimensions)

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→ if the units are already securely installed, the O / L3 measure can be adjusted by sliding the hubs onto the shaft. Here, a sufficient supporting length of the keyway must be ensured

→ any deviation from this measure may not exceed the max. axial initial misalignment in accordance with table 8.1

→ if the O or L3 measure is not adhered to, the coupling may be damaged.

4. Align the hubs (items 1 and 2) to one another, see chapter 8.3.
 - The available misalignments should be measured using suitable measuring equipment e.g. dial gauge, straightedge, feeler gauge or depth gauge.
 - The max. initial misalignments may not be exceeded.
5. Secure the hubs with fitting screws and tighten them with the specified tightening torque in table 7.5. It is recommended to use Loctite medium strength thread locking.



Attention!

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

8.3. Alignment procedure

For simplification, the suitable measurement methods for each type of misalignment will be described. Whereby all misalignment types can occur simultaneously.

The remaining misalignments should generally be as small as possible. The size of the misalignments that may occur during assembly are specified in table 8.1.



Attention!

The remaining misalignments should generally be as small as possible. When commissioning, the actual misalignments should be no more than 25% of the max. permissible misalignment figures (Table 7.2). The remaining 75% of misalignments provide security against external influences that arise during operation, such as deformation in the machine and thermal expansion.

Size	Max. permissible misalignments RDL...DSO / RDL...DSZ / RDL...DSA			Max. permissible misalignments RDL...DSZ / RDL...DSA
	Axial ΔK_A [mm]	Angle for each disc pack ΔK_w [°]	Indicator value for angular misalignment [mm]	Radial ΔK_r [mm]
024	±0.25	0.18	0.125	L3 x 0.003
038			0.375	
048				
065				
075				
100	±0.5	0.18	0.700	L3 x 0.003
110				
125				
140				
150				
160				

Table 8.1: Max. initial offsets

Coupling RDL...DSO cannot compensate any radial misalignment.

8.3.1 Check the radial misalignment

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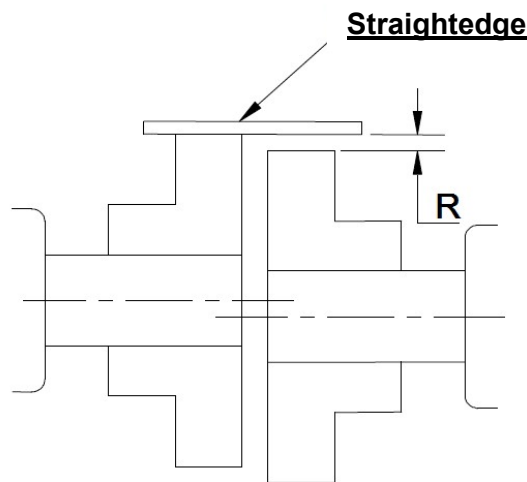


Figure 8.1: Measurement with a straightedge

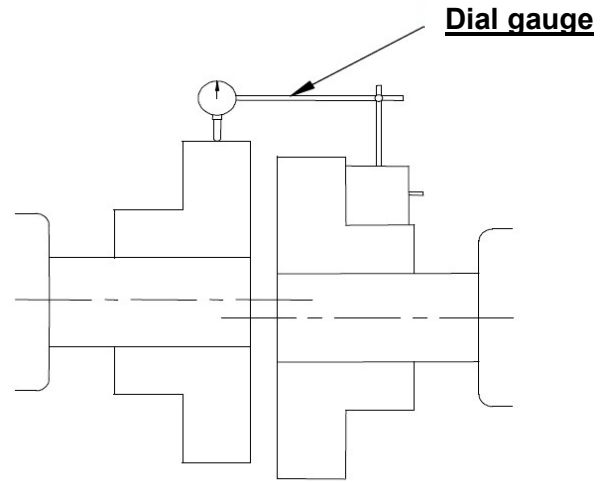


Figure 8.2: Measurement with a dial gauge

The following measurement methods can be used to check radial/parallel misalignment.

Take a straightedge and place it on the hub as shown in figure 8.1. Turn the other hub until distance $R = 0$ is set. Taking this point as a basis, measure at an approx. 90° offset with a feeler gauge distance "R". To be sure, distance R can be measured again at another approx. 180° . It can also be carried out in a similar manner with a depth gauge. The largest measured distance indicates the given radial misalignment.

Alternatively, the radial misalignment can be measured with a dial gauge. The dial gauge holder is mounted on a hub. Afterwards, the volumetric flask is placed on the processed outer diameter of the second hub (see figure 8.2). Turn the hub by one revolution and read off the full deflection of the dial gauge. The radial misalignment amounts to half the full deflection.

Compare the maximum measured value with the permissible value of the initial misalignment in table 8.1. If the permissible value is exceeded, better alignment needs to be carried out.

8.3.2 Inspection of the angular misalignment

Calculate the maximum ($X_{\max.}$) and minimum ($X_{\min.}$) distance between the hubs (see figure 8.3) using a feeler gauge. The difference between both values specifies the indicator value for the angular misalignment in mm. The respective indicator value for the respective angular misalignment can be found in table 8.1.

Alternatively, a measurement can be carried out using a dial gauge. For this, set the dial gauge holder on a hub and the measuring pin on the plane surface of the other hub as displayed in figure 8.4. It should hereby be positioned as closely as possible to the outer diameter. Turn the hub one full revolution and note the full deflection value. The half of the full deflection provides the indicator value for the angular misalignment in mm.

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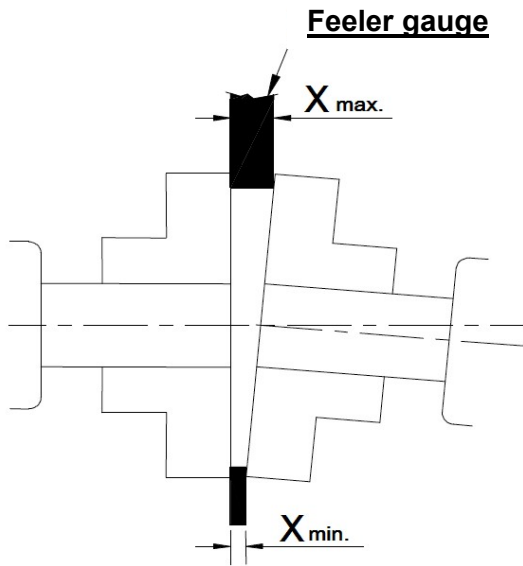


Figure 8.3: Measurement with the caliper

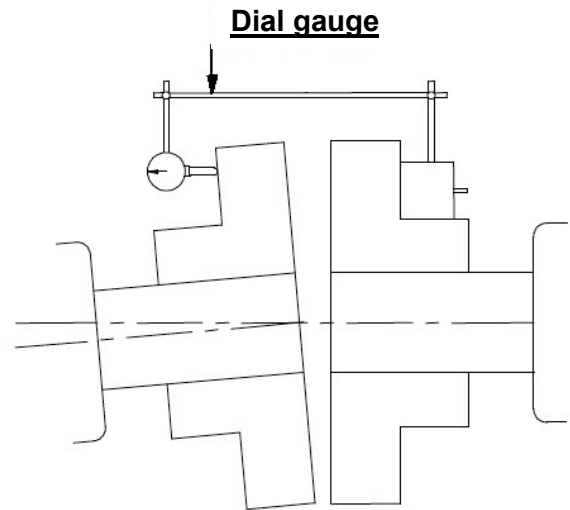


Figure 8.4: Measurement with a dial gauge

9. Assembly of the coupling

After the hubs have been mounted and aligned on the shaft ends and the locking screws have been tightened to the specified tightening torque, the assembly of the remaining parts can be carried out.

During assembly, all screws need to be tightened to the specified tightening torque. The respective tightening torques can be found in table 9.1.

Size	Screws of disc pack RDL...DSO/...DSZ/...DSA		Screws of hub at RDL...DSA	
	Thread	Tightening torque T_A [Nm]	Thread	Tightening torque T_A [Nm]
024	M6	10	M6	12.8
038	M6	10	M6	12.8
048	M8	23	M8	31.2
065	M10	46	M10	61.6
075	M12	80	M10	61.6
100	M14	129	M10	61.6
110	M16	150	M10	61.6
125	M18	205	M10	61.6
140	M20	285	M10	61.6
150	M22	380	M12	108
160	M24	400	M12	108

Table 9.1: Size and tightening torque of the screws

9.1 Assembly of the disc coupling RDL...DSO

1. Clean all parts thoroughly.
2. Turn the hub so that the balancing markings are aligned flush to both hubs.
3. Insert the disc pack between the hubs as shown in figure 9.1.
4. Insert the spacer sleeve (item 4) onto the screws (item 6) and guide it through the large bore in the hub, disc pack and the second hub.
→ the long spacer sleeve is used for hub type I and the short spacer sleeve is used for hub type 0.

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5. Screw the self-locking nut (item 7) onto the screw.
6. For the next bore, the screw (item 6) is pushed through the first hub, disc pack and second hub.
7. The spacer sleeve (item 5) and the self-locking nut (item 7) are then mounted onto it.
8. Repeat steps 4 to 7 until all screws are installed
→ Always install in the same direction in clockwise or anti-clockwise direction
9. Tighten all screws to the specified tightening torque in table 9.1.

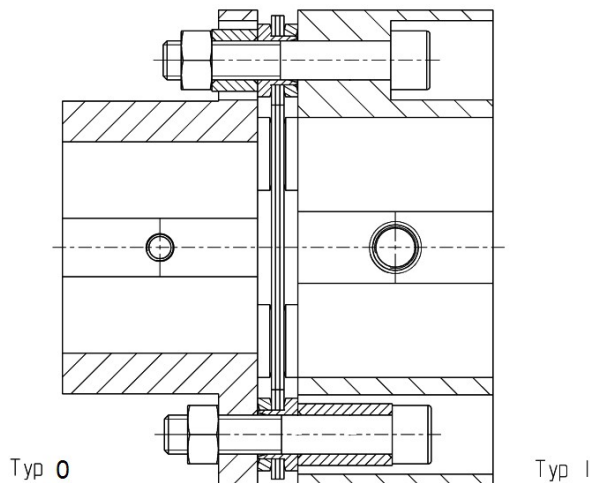


Figure 9.1: Assembly of RDL...DSO

9.2 Assembly of the disc coupling RDL...DSZ

1. Clean all parts thoroughly.
2. Hold the spacer between two hubs in such a manner that the large bores in the spacer are flush with the small bores in the hubs.
3. Ensure here that the balancing markings on both hubs and spacer correspond one another.
4. Insert the disc pack between the hub and spacer as shown in figure 9.2.
5. Put the spacer sleeve (item 4) onto the screws (item 6) and guide it through the large bore in the hub, disc pack and the spacer.
→ the long spacer sleeve is used for hub type I and the short spacer sleeve is used for hub type 0.
6. Screw the self-locking nut (item 7) onto the screw.
7. With the next bore, the screw (item 6) is pushed through the hub, the next disc pack and the spacer.
8. Afterwards, the short spacer sleeve (item 5) and the self-locking nut (item 7) come on top.
9. Repeat steps 4 to 7 until all screws are installed on both sides
→ Always install in the same direction in clockwise or anti-clockwise direction
10. Check the alignment. Initial max. misalignments specified in table 8.1 may not be exceeded. If necessary, it must be aligned again.
11. Tighten all screws to the specified tightening torque in table 9.1.

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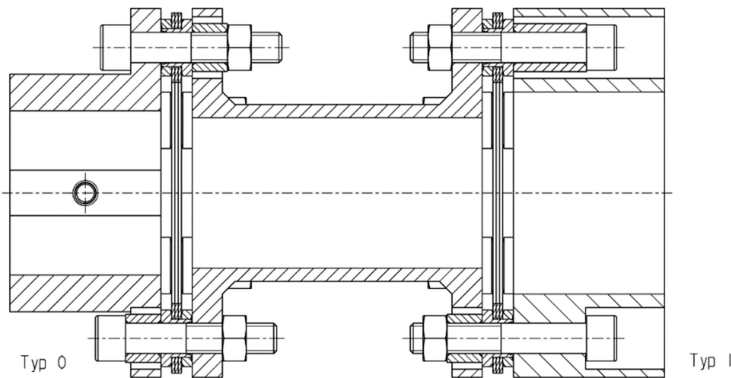


Figure 9.2: Assembly of RDL...DSZ

9.3 Assembly of the disc couplings RDL...DSA

1. Clean all parts thoroughly.
2. Ensure that the screws and nuts of the transmission group are tightened to the required tightening torque in accordance with table 9.1.



Attention!

The nuts marked in yellow are factory fitted and tightened to the required tightening torque. They may not be loosened.

3. The disc packs may not be deformed and the total length of the transmission group must correspond with the length between the inner plane surfaces of the hubs.
4. Press the transmission group lightly together and insert it between the hubs.
5. Ensure that the transmission group falls into the envisaged centering in the hubs.
6. Ensure here that the balancing markings on both hubs and transmission group correspond with one another.
7. Slide the screws through the hubs and screw them into the intermediate flange of the transmission group.
8. Check the alignment. The max. initial misalignments specified in table 8.1 may not be exceeded. If necessary, it must be re-aligned.
9. Tighten all screws to the specified tightening torque in table 9.1.

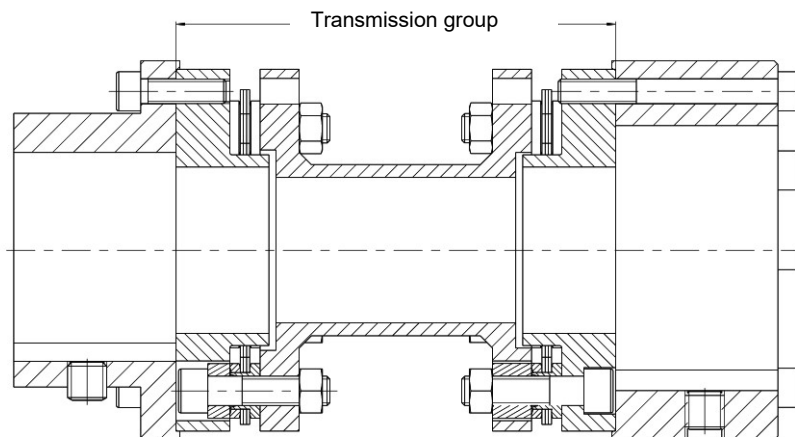


Figure 9.3: Assembly of RDL...DSA

10. Start-up

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

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- the tightening torque of all screws,
- the tightness of the set screws (locking screw),
- the alignment of the coupling,
- the clearance O / L3,
- the fastening screws of the drive unit.

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. Next, the causes for the disturbance should be determined. If the cause cannot be found, RING-SPANN must be consulted.



Attention!

The overload of the coupling in operation can never be completely ruled out. If the coupling breaks due to overload, the flying parts can cause injury to persons and damage to property.

11. 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.

Disturbances	Causes	Remedy
Changes in running noises and/or vibrations occurring	Alignment error	1) Eliminate the cause of the alignment error 2) Carry out wear inspection 3) Re-align the coupling
	Loose screws, minimal friction in the disc pack	1) Check coupling parts 2) Replace damaged parts 3) Tighten screws to the specified tightening torque 4) Check alignment and correct if necessary
	Locking screw to secure the hubs is loose	1) Check alignment 2) Tighten locking screws to the specified tightening torque and secure with Loctite thread locking 3) Check all parts for wear
Break of the disc pack	Break of the discs due to shock overload peaks	1) Disassemble coupling 2) Disassemble and replace damaged parts 3) Find and eliminate cause for the overload 4) Align coupling
	The coupling selected is too weak/wrong	1) Check operating parameters and if necessary select larger coupling 2) Mount new coupling 3) Check alignment and correct if necessary
	Operating errors at the facility	1) Check coupling parts 2) Replace damaged parts 3) Mount and align coupling

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		4) Instruct / train operator
Tears / break of the disc packs or screws	Vibrations in the drivetrain	1) Check coupling parts 2) Replace damaged parts 3) Mount coupling 4) Align coupling 5) Find and eliminate cause for vibrations.

Table 10.1: Operational disturbances

12. Maintenance and repair


The disc coupling is a low-maintenance coupling. Still, when carrying out maintenance on the facility, it must be inspected at least once a year. The scope of the inspection includes:

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

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


When checking the disc packs for wear, particular attention must be paid to tears or other signs of fatigue. If one or more discs are broken, all disc packs of the coupling must be replaced.

Over time, changes can occur in the machine support that have an impact on the alignment of the coupling. For this reason, the alignment must be examined and corrected if necessary within the scope of each inspection.

	<p>Attention! The self-locking nuts must be replaced after they have been tightened for the 4th to 5th time.</p>
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13. 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.

	<p>Attention ! RINGSPANN shall not assume any liability for any occurring damages if spare parts from other manufacturers are used .</p>
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14. Disposal

All coupling parts are made of metal. At the end of its service life, metals must be cleaned and disposed of properly as metal scrap.

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15. Supplement for operation in areas with potentially explosive atmosphere

15.1. Normal operation

The disc coupling is manufactured in the types RDL...DSO/DSZ/DAS. The individual types are described in the shaft couplings catalogue. The operator's design of the disc 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. The disc coupling must not be operated within the range of natural vibrations.

The hubs are manufactured in steel with a keyway connection as standard. The bores can be supplied finished or pre-drilled in a specified dimensional range. Shape and position tolerances for the user-side finished bore are specified in the installation and operating instructions. Materials and qualities are specified as follows as standard:

Type	Component	Material
RDL ... DSO/DSZ/DSA	Hub	ASTM A1040
	Disc	SS301
	Sleeve	ASTM A1040
	Screw/nut	12.9
	Interim pieces	ASTM A1040
RDL ... DSA	Interim flange	ASTM A106
		ASTM A36
		ASTM A1040

ASTM EN19 or ASTM EN24 is used as an alternative for high-speed applications.

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

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

On request, the shaft connection can also be made with a TAPER clamping bush. The selection and dimensioning of the shaft-hub-connection is the responsibility of the user.

The disc 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.

15.1.1. 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.

15.1.2. 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)

15.1.3. 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:

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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.

15.1.4. 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 disc coupling is maintained by competent personnel who have been instructed in the explosion hazards associated with the disc coupling.

15.1.5. Instructions for use


The disc 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 °C < T_a < +140 °C

In device group II for all gas groups:

CE  II 2G Ex h IIC T6/T5/T4/T3/T2 Gb.
-20 °C < T_a < +75/90/125/190/280 °C

In device group II for all dust groups:

CE  II 2D Ex h IIIC T85/T100/T135/T200/T290°C Db.
-20 °C < T_a < +75/90/125/190/280°C

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

The following measures must be observed to avoid ignition sources:

- The disc coupling may not circulate in an accumulation of dust.
- The disc coupling must be checked regularly for corrosion, abrasion and breakage of individual discs. The disc pack must be replaced if wear or breakage is detected.
- All screw connections are to be secured with the specified tightening torque.
- The hubs must be secured against displacement on the shaft ends by means of grub screws.
- The integration of the connected machines in the equipotential bonding of the system must be carried out in accordance with DIN EN 60204-1.

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- The disc coupling must be secured against impact by means of a separating protective device. The separating protective device should have a distance to the disc coupling which amounts to at least double the division of a disc.
- Openings or gaps in 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 couplings do 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.

15.2. Instructions on occupational health and safety



If the disc 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 disc 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 disc coupling is suitable for operation in the actual given explosive atmosphere based on the instructions for use.

The disc 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 disc coupling must be brought to a standstill by the operator. The disc 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, 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.

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15.3. Setup and assembly



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

All screws must be tightened with the specified torque.

15.4. 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.

In rare cases, individual discs can break and stand up due to the bending stress. The disc could generate ignitable impact sparks.

The disc coupling must be checked regularly for corrosion, abrasion and breakage of individual discs. The disc pack must be replaced if wear or breakage is detected.

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

15.5. Testing



The disc 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.

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The disc 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.

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16. 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: Disc coupling RDL...DSO / ...DSZ / ...DSA

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 the "Supplement Ex" to the operating instructions.

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 the "Supplement Ex" to the operating instructions 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

ppa. Ernst Fritze
Technical Manager



i.A. Martin Schneeweis
Product Manager