

**Installation and operating instructions for
elastic jaw coupling REK ... DCO**

E 06.696e



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As of: 24.09.2020	Version: 03	Signed: SCHW	Checked: EISF	Number of pages: 20	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 elastic jaw coupling consists in transferring the torque of one shaft end onto another element. Additionally, the coupling is designed to compensate angular, radial and axial displacements and reduce the intensity of vibrations and shocks.

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 couplings are designed on the basis of DIN 740, part 2 (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 locking screws are in compliance with DIN EN ISO 4029.

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

Type REK ... DCO 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
- Material number
- Abbreviated designation

Spiders:

- RINGSPANN logo
- Size designation

2.2. Dimensions

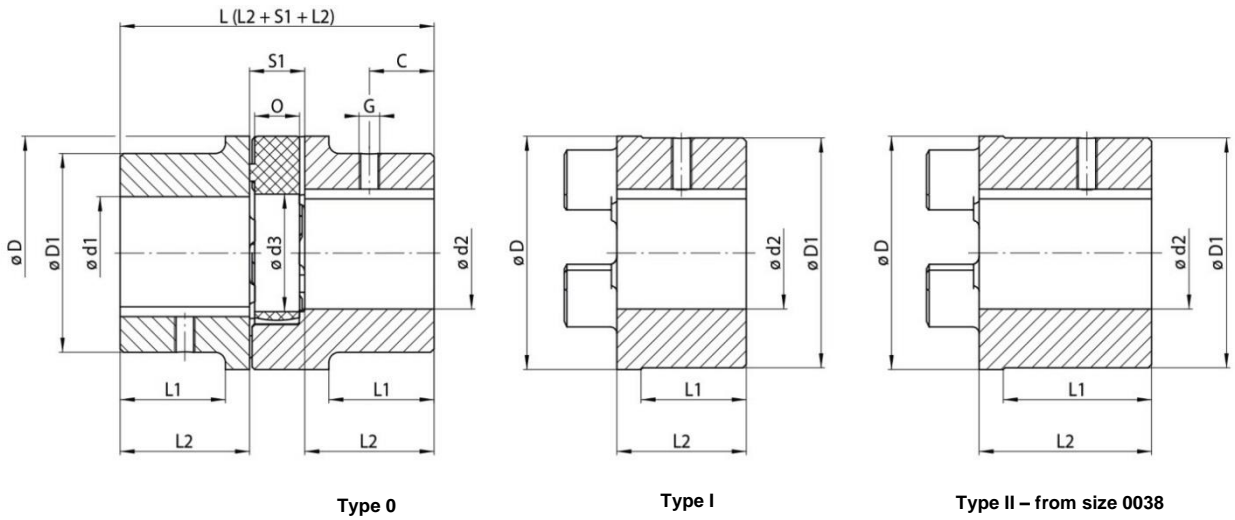


Figure 2.1: Drawing REK...DCO

Size	Dimensions [mm]													
	d3	D	D1		C		L		L1		L2		O	S1
			Hub type 0	Hub type I+II	Hub type 0+I	Hub type II	Hub type 0+I	Hub type II	Hub type 0+I	Hub type II	Hub type 0+I	Hub type II		
19	18	41	32	41	12.5	-	66	-	20	-	25	-	12	16
24	27	56	40	56	15.0	-	78	-	24	-	30	-	14	18
28	30	66	48	66	17.5	-	90	-	28	-	35	-	15	20
38	38	80	66	78	22.5	35.0	114	164	37	62	45	70	18	24
42	46	95	75	94	25.0	37.5	126	176	40	65	50	75	20	26
48	51	105	85	104	28.0	40.0	140	188	45	69	56	80	21	28
55	60	120	98	118	32.5	45.0	160	210	52	77	65	90	22	30
65	68	135	115	133	37.5	50.0	185	235	61	86	75	100	26	35
75	80	160	135	158	42.5	55.0	210	260	69	84	85	110	30	40
90	100	200	160	198	50.0	62.5	245	295	81	106	100	125	34	45

Table 2.1: Dimensions

2.3. Parts list

Position	Quantity	Description
1	2	Hub
2	1	Spider
3	2	Set screw

Table 2.2: Parts list

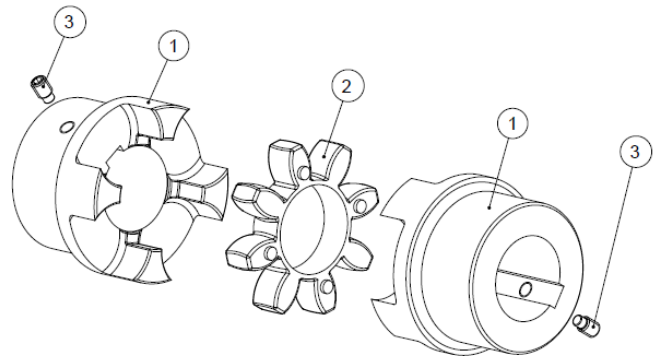


Figure 2.2: REK...DCO

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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 REK ... DCO 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 REK ... DCO 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>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

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:

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6. Storage

The coupling hubs can be stored for 6 - 9 months in a roofed, dry room.

Under the same storage conditions, the properties of the coupling spiders remain unchanged for up to 5 years.

Storage rooms must:

- have a roof and be dry,
- be free of ozone-producing equipment,
- have a relative humidity of less than 65%,
- be free of condensation.

7. Technical prerequisite for reliable operation

7.1. Maximum speeds

Size	max. speed [min ⁻¹]		
	Steel	Grey cast iron	Aluminium
0019	18650	-	19000
0024	13650	-	14000
0028	11600	-	11800
0038	9500	7100	-
0042	8000	6000	-
0048	7200	5600	-
0055	6350	4750	-
0065	5650	4250	-
0075	4750	3550	-
0090	3800	2800	-

Table 7.1: Maximum permissible speeds

7.2. Permissible displacements

Größe	Max. permissible displacements		
	Axial ΔK_a [mm]	Radial ΔK_r [mm]	Angular ΔK_w [°]
0019	± 1.6	0.15	0.8
0024	± 1.8	0.20	0.8
0028	± 2.0	0.20	0.8
0038	± 2.2	0.25	0.9
0042	± 2.3	0.30	0.9
0048	± 3.0	0.35	1.0
0055	± 3.0	0.35	1.0
0065	± 3.5	0.40	1.0
0075	± 3.5	0.45	1.1
0090	± 4.5	0.50	1.1

Table 7.2: Maximum permissible displacements

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.

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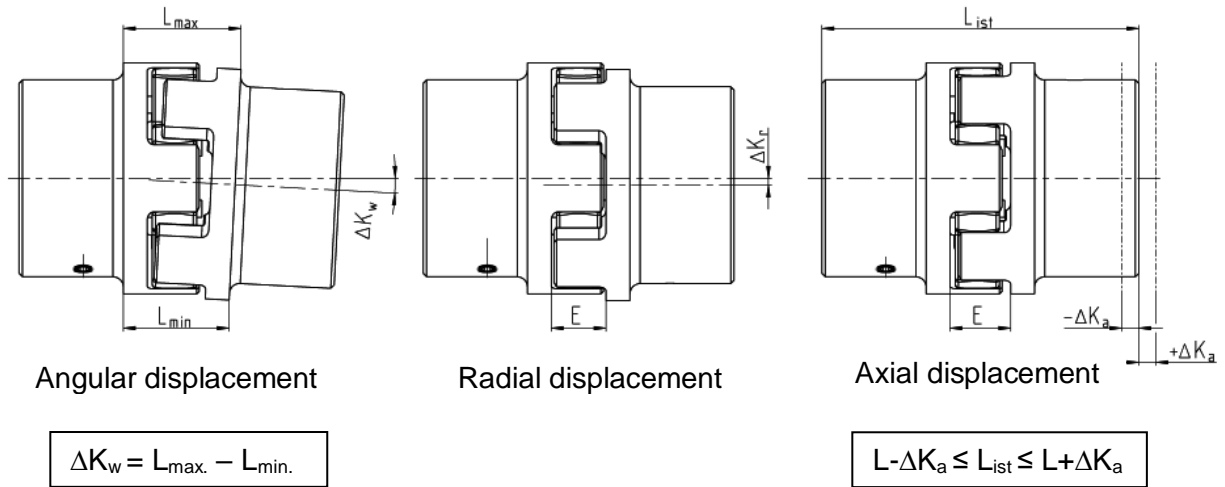


Figure 7.1: Displacement types

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

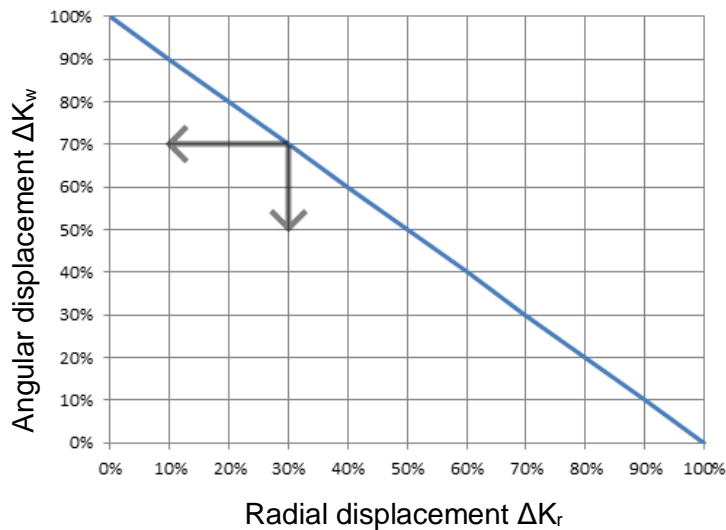



Figure 7.2: Displacement combination

The displacement as a percentage is calculated as follows:

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

More information on the measurement method can be found in chapter 8.2 Assembly.

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.

Size	Bore d1/d2 [mm]					
	Hub type 0		Hub type I		Hub type II	
	min.	max.	min.	max.	min.	max.
0019	6	19	19	24	-	-
0024	9	24	22	28	-	-
0028	10	28	28	38	-	-
0038	12	40	38	48	12	48
0042	14	45	42	55	14	55
0048	15	52	48	62	15	62
0055	20	60	55	74	20	74
0065	22	70	65	80	22	80
0075	30	80	75	95	30	95
0090	40	97	90	110	40	110

Table 7.3: Permissible bore diameter

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).

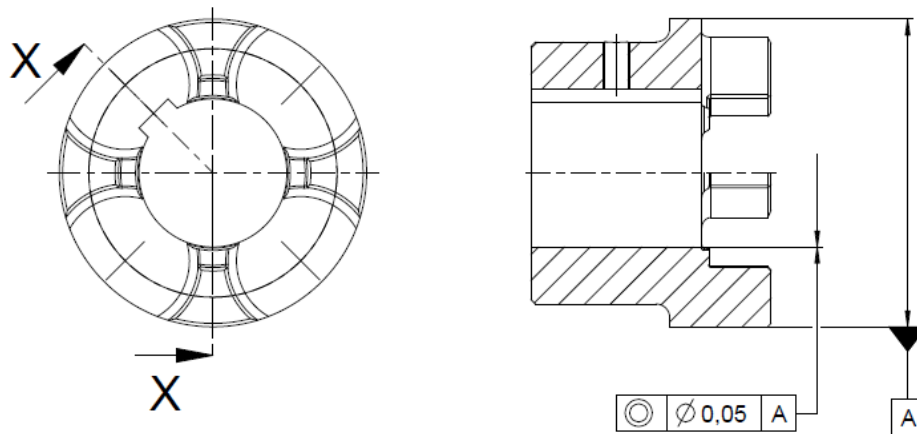


Figure 7.3: Specifications for the form and positional tolerance of the bore and position of the keyway nut

If the hub is to be designed with a keyway, it is preferably to be introduced between the jaws as in figure 7.3. The design and inspection of the keyway connection falls to the operator and is his responsibility.

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The following fit pair in accordance with DIN 748/1 is recommended:

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

Table 7.4: Fit pairs



Note!

The operator bears the sole responsibility for damages that may occur as a result of defective rework on the unbored / pre-bored coupling parts .

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
	to	22	38	58	75	110	260
Size locking screw		M5	M6	M10	M12	M16	M20
Tightening torque [Nm]		2	4	17	40	80	140

Table 7.5: Size and tightening torques of the locking screws



Attention!

RINGSPANN shall not assume any liability for any resulting damages that arise from work carried out by the operator .

7.4. Spider

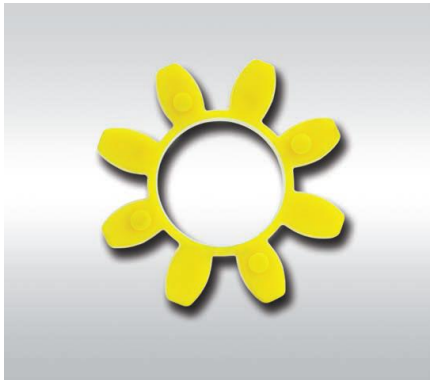


Figure 7.4: PU 92 Shore-A

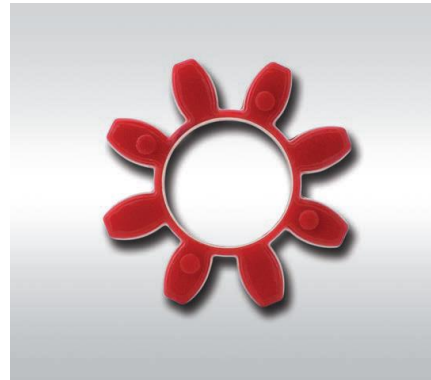


Figure 7.5: PU 95 Shore-A

Elastomer element PU 92 Shore-A

Material: Polyurethane
 Hardness: 92±2 Shore-A
 Deployment temperature: -30 °C to 80 °C
 Colour: yellow

Elastomer element PU 95 Shore-A

Material: Polyurethane
 Hardness: 95±2 Shore-A
 Deployment temperature: -30 °C to 90 °C
 Colour: red

Size	Nominal torque T _{KN} [Nm]	Max. torque T _{KMAX} [Nm]
0019	9.6	19
0024	33	69
0028	91	186
0038	181	372
0042	253	510
0048	296	600
0055	392	800
0065	590	1220
0075	1220	2500
0090	2290	4700

Table 7.6: Technical specifications PU 92

Size	Nominal torque T _{KN} [Nm]	Max. torque T _{KMAX} [Nm]
0019	16	32
0024	57	114
0028	153	304
0038	310	610
0042	430	850
0048	500	990
0055	650	1300
0065	890	1780
0075	1830	3640
0090	3430	6800

Table 7.7: Technical specifications PU 95

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 feather key and the keyway (see 7. Technical prerequisite for reliable operation).

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8.2. Assembly description

1. Mount the hub on the input and output side
→ facilitated sliding onto the shaft by heating up the hub (approx. 80°C)



Attention!

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

2. Insert the spider between the jaws of the input-sided or output-sided hub
3. Slide the units in axial direction until the S1 measure is achieved (see chapter 2.2 Dimensions)
→ if the units are already mounted, the S1 measure can be adjusted by sliding the hubs onto the shaft. Here, a sufficient supporting length of the keyway must be ensured.
→ if S1 is not adhered to, the coupling may be damaged.
4. Tighten the set screws with the respective tightening torque (see table 7.5 Manufacturing the hub bore),
5. Measurement of the displacements:

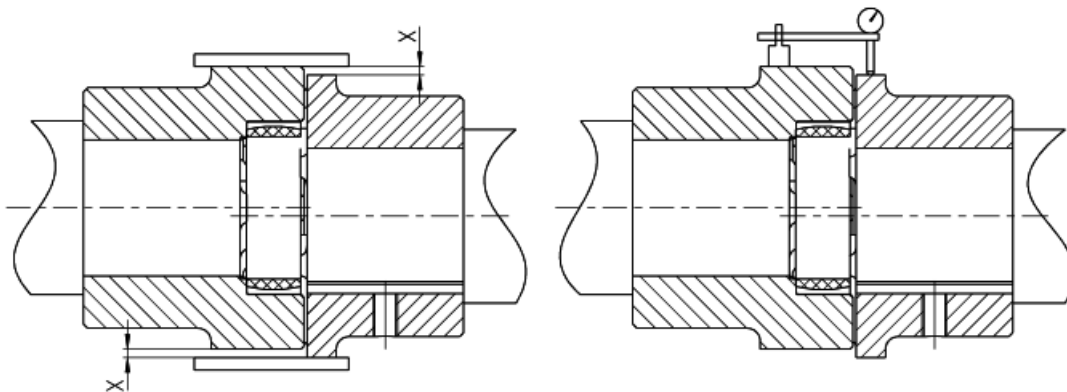


Figure 8.1: Measuring the displacements

The given displacements should be measured with suitable measuring equipment, e.g. dial gauge, straightedge, feeler gauge or depth gauge.



Information

If the d_3 measure of the spider is greater than the shaft diameter with the inserted keyway, one or two shaft ends may protrude into the spider.

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

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9. 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 S1.

The operator has the task of attaching 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.

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.

Disturbances	Causes	Remedy	Danger notice for areas with potentially explosive atmosphere
Changes in sounds or vibrations	Alignment error	1) Eliminate the cause of the alignment error 2) Carry out wear inspection	Increased temperature on the spider surface, ignition risk as a result
	Spider wear → transfer torque via metal contact	1) Disassemble coupling, remove spider residues 2) Check coupling parts, replace damaged parts 3) Insert spider, mount coupling parts 4) Check alignment, correct if necessary	Ignition risk due to formation of sparks
	Screws for axial hub securing are loose	1) Check alignment 2) Tighten screws for hub securing, secure against repeated loosening 3) Carry out wear inspection	Ignition risk due to hot surfaces and spark formation
Jaw break	Spider wear → transfer torque through metal contact	1) Replace entire coupling 2) Check alignment	Ignition risk due to spark formation
	Overload	1) Replace entire coupling 2) Check alignment 3) Determine reason for overload	

	Operating parameters do not correspond to the coupling output	<ol style="list-style-type: none"> 1) Check operating parameters, select larger coupling if necessary 2) Install new coupling 3) Check alignment 	
	Operating error	<ol style="list-style-type: none"> 1) Replace the entire coupling 2) Check alignment 3) Instruct and train operating staff 	
Premature spider wear	Alignment error	<ol style="list-style-type: none"> 1) Eliminate the reason for the alignment error 2) Carry out wear inspection 	Increased temperature on the spider surface, ignition risk as a result
	Physical changes due e.g. to too low/high ambient temperature, contact with aggressive liquids	<ol style="list-style-type: none"> 1) Disassemble coupling, remove spider residues 2) Check coupling parts, replace damaged parts 3) Insert spider, install coupling parts 4) Check alignment, correct if necessary 5) Ensure that all triggers for the physical changes have been eliminated 	Ignition danger due to spark formation for metallic contact of the cams
	Impermissible ambient, contact temperatures	<ol style="list-style-type: none"> 1) Disassemble coupling, remove spider residues 2) Check coupling parts, replace damaged parts 3) Insert spider, install coupling parts 4) Check alignment, correct if necessary 5) Check and regulate temperatures, possibly select different spider material 	
Premature spider wear due to liquefaction on the inside of the spider cams	Drive vibrations	<ol style="list-style-type: none"> 1) Disassemble coupling, remove spider residues 2) Check coupling parts, replace damaged parts 3) Insert spider, install coupling parts 4) Check alignment, correct if necessary 5) Determine cause of vibrations, possibly select spider with smaller/higher shore hardness 	

Table 10.1: Operational disturbances

To ensure that the coupling can be operated safely, the specified wear values may not be exceeded.

Size	Wear limit	Tooth width
	X_{max} [mm]	B_{new} [mm]
0019	3	7
0024	3	9
0028	3	11
0038	3	14
0042	4	16
0048	4	18
0055	5	20
0065	5	23
0075	6	26
0090	8	33

Table 10.2: Wear limits

Check these wear values as follows:

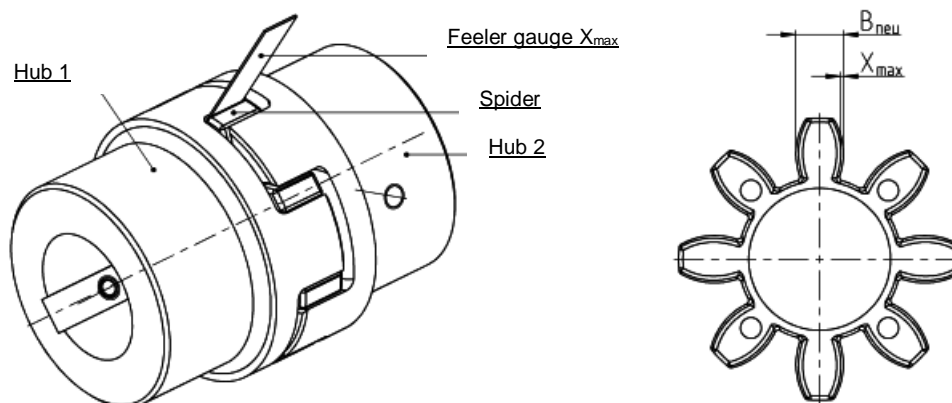


Figure 10.1: Check the wear limit

11. Maintenance and repair

Even if REK ... DCO ranks among the more low-maintenance couplings, it should be subject to a visual inspection at least once a year. This includes:

- examining the coupling alignment,
- examining the coupling for damages,
- examining the screw connections,
- examining the spider wear.

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

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.

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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.

Please also properly dispose of the packaging.

14. Supplement for operation in areas with potentially explosive atmosphere

If the elastic shaft coupling REK ... DCO is operated in or in connection with potentially explosive atmosphere, the following supplemental information must also be observed.

14.1 Normal operation

The coupling REK ... DCO is a device in the sense of Directive 2014/34/EU and may only be used in or in connection with explosive atmosphere under observation of the following information.

14.1.1 Explosive atmosphere

Surrounding pressure p_U	0.8 to 1.1	bar
Oxygen content r_{O_2}	approx. 21	Vol-%


The permissible ambient temperature T_a depends on the spider material used, see section 3.2.

The use in potentially explosive atmosphere due to explosive dusts or instable substances is excluded.

14.1.2 Instructions for use



Coupling REK ... DCO is designed ignition source-free according to the respective category pursuant to DIN EN ISO 80079-36. The use of coupling REK ... DCO in connection with explosive atmosphere is dependent on the used material and the frame size of the spider. The following approvals apply:

In equipment group I, category M2 or EPL Mb in all frame sizes from 0019 to 0090 with the label:

CE  I M2 Ex h Mb X
 T_a in accordance with the operating instructions

In equipment group II, category 2G and 2D or EPL Gb and Db in all frame sizes from 0019 to 0090 with the label:

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CE  II 2G Ex h IIC TX Gb
CE  II 2D Ex h IIIC TX Db
T_a and TX in accordance with the operating instructions

The permissible ambient temperature T_a and the temperature class (for gases) / max. surface temperature (for dusts) are as follows according to the colour of the spider material:

The minimum ambient temperature amounts to:

Colour Spider material	Ambient temperature
yellow	-40°C ≤ T _a
red	-30°C ≤ T _a

The maximum ambient temperature, the temperature class and the maximum surface temperature amount to:

Colour Spider material	Ambient temperature	Temperature class	max. surface temperature
yellow	T _a ≤ 55°C	T6	T80°C
red	T _a ≤ 65°C	T5	T90°C

The elastomers used are not flame retardant. The elastomers of coupling size 0090 have a total weight of more than 0.5 kg. The suitability of this coupling size for use in Group I must be checked by the operator (DIN EN ISO 80079-38:2017, 6.2).

The design limits in accordance with RINGSPANN catalogue “shaft coupling” must be observed. The permissible displacement values in accordance with the installation and operating instructions may not be exceeded. The coupling may not be operated in the area of natural oscillations.

The coupling materials used may not be chemically influenced by the ambient atmosphere.

To prevent mechanical ignition sources, metallic contact with the turning coupling must be prevented. This can, for example, be ensured using suitable coupling protection (fixed separating protection device). Openings or gaps in/with the separating protective equipment must be designed at least in IP 2X in accordance with IEC 60529. In group I, the coupling protection must be able to withstand the difficult operating conditions.

Couplings are not available in aluminium in group I.

14.2 Instructions on occupational health and safety



If coupling REK ... DCO 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 coupling REK ... DCO 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.

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

Coupling REK ... DCO 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 coupling must be brought to a standstill by the operator. The 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.

14.3 Setup and assembly



The coupling halves are to be secured against axial displacement. If the coupling halves are not threaded up against a shaft shoulder, they must be secured with a locking screw. The locking screw is to be secured with an adhesive, Loctite 243 or equivalent, against becoming loose.

To guarantee preventing metallic contact, the coupling halves must be installed with the specified gap "S₁".

All screws must be tightened with the specified torque.

The spider is made of an insulating material and prevents a direct potential equalisation between the coupling halves. The potential equalisation between the coupling halves must be secured by the unit.

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 or any vibrations that should arise.

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The spider may be worn due to friction, meaning that the coupling halves touch and ignitable impact sparks can form. The wear must therefore be regularly examined in accordance with the installation and operating instructions. In the event of impermissible wear, the spider must be replaced.

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

14.6 Testing



Coupling REK ... DCO 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.

Coupling REK ... DCO 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.

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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

Hereby declared: RINGSPANN GmbH
Schaberweg 30-38
61348 Bad Homburg

that the operating instructions described in the operating instructions are complied with.

Device: Coupling REK...DCO

complies with the essential health and safety requirements of Directive 2014/34/EC, Annex II. The application possibilities result from the marking and the instructions for use in chapter "14. Supplement for operation in areas with potentially explosive atmosphere" of the operating instructions.

The following harmonized standards and/or normative documents have been taken into account, in whole or in part, in the design and manufacture of this equipment:

European standards	National standards / normative documents
DIN EN 1127-1 :2008 DIN EN 15198 :2007 DIN EN ISO 80079-36 :2016 DIN EN ISO 80079-38 :2017 DIN EN ISO 80079-37 :2017	

The special operating instructions in chapter "14. Supplement for operation in areas with potentially explosive atmosphere " of the Operating Instructions must be observed.

The technical documentation in accordance with Annex VIII, No. 3 has been prepared and deposited with the notified body 0044. The deposit number is 35256895.



Martin Schneeweis, Product Manager Shaft Couplings
Bad Homburg, 16.12.2019