

# BMA 0008

## Instruction and Installation Manual **DENTEX<sup>®</sup>**

- Compensation of axial, radial and angular misalignment of shafts through double cardanic action
- Simple and easy assembly
- High electrical insulating property
- High thermal stability
- No maintenance

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The DENTEX® tooth coupling has the ability to compensate for the angular, radial and axial displacement produced by manufacturing and assembly tolerances.

## 1.0 General information:

Carefully read through this installation manual before installing the DENTEX® tooth coupling. Pay particular attention to the safety instructions!

The installation manual is part of your product. Store it carefully and in the vicinity of the DENTEX® tooth coupling.

The copyright for this installation manual shall remain with **R+L Hydraulics GmbH**.

### 1.1 Safety and information symbols:



**Danger Risk of injury to personnel**



**Caution Damage could occur to the machine**



**Note Note regarding important information**



**Caution Notes / instructions on use in Ex zones**

### 1.2 General hazard warnings:



During installation and removal of the DENTEX® tooth coupling, make sure that the entire drive train is secured to prevent accidental activation, and that the system is depressurized. Failure to handle rotating parts in the proper manner can cause serious injury. For this reason, the following safety instructions should be read and followed without exception.

- All work on the DENTEX® tooth coupling should be performed from the perspective of  
→ “Safety First”
- Switch off the drive unit before carrying out work on the DENTEX® tooth coupling.
- Secure the drive unit to prevent unintentional activation, e.g. by attaching information signs to the switch-on points or removing the fuse at the power supply.
- Do not reach into the working area of the machine while it is still in operation.
- Protect the rotating parts to prevent accidental touching. Attach the relevant protective devices and covers.

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## 2.0 Intended use:

You may only install and maintain the DENTEX® tooth coupling if you:

- have carefully read and understood the installation manual
- are authorized and trained to do so

The DENTEX® tooth coupling may only be used in accordance with the technical specifications. Unauthorized structural changes to the DENTEX® tooth coupling is prohibited. We will not accept any liability for damage occurring as a result of this. In the interest further development, we reserve the right to make technical changes. The DENTEX® tooth coupling described here corresponds with the latest technical standards at the time of publication of this installation manual. The DENTEX® tooth coupling is usually delivered ready for installation.

## 3.0 Storage

- It should be possible to store the coupling hubs in a covered, dry place for 6 months.
- Provided that storage conditions are favorable, the properties of the coupling sleeves will remain unaltered for up to 5 years.



**The storage areas must not contain any ozone-producing devices, such as fluorescent light sources, mercury-vapor lamps, or high-voltage electrical equipment. Damp storage areas are unsuitable. Make sure that no condensation is produced. A favorable relative humidity level would be below 65%.**

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## 4.0 Dimensions:

### 4.1 DENTEX® tooth coupling

Figure 1: Diagram of the DENTEX® tooth coupling, series B

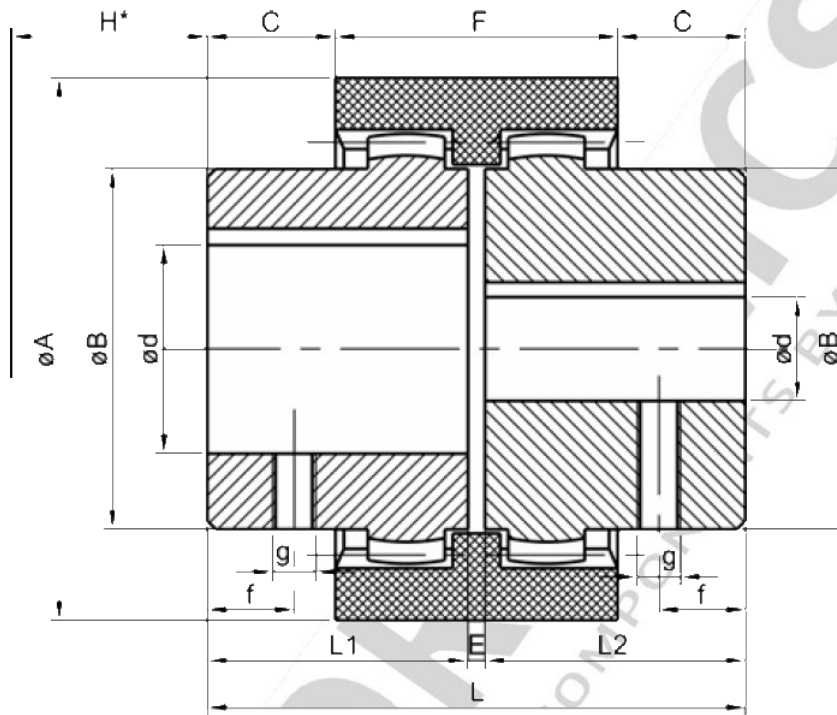


Table 1: Dimensions of the DENTEX® tooth coupling, series B

Type	Pre-bored	Finish bores d [mm]												Extended hub length	Weight kg	Moment of inertia J kg/m²
			min.	max.	A	B	L	L1+L2	E	H*	C	F	g			
B-14	5	6	14	40	25	50	23	4	15	6.5	37	M5	6	40	0.175	0.000030
B-19	8	9	19	48	30	54	25	4	17	7.0	37	M5	6	-	0.320	0.000470
B-24	9	10	24	52	36	56	26	4	17	7.5	41	M5	6	50	0.316	0.000093
B-28	9	10	28	66	44	84	40	4	20	19.0	46	M8	10	55	0.739	0.000310
B-32	11	12	32	76	50	84	40	4	20	18.0	48	M8	10	55	0.950	0.000550
B-38	12	14	38	83	58	84	40	4	20	18.0	48	M8	10	60	1.220	0.000870
B-42	16	20	42	92	65	88	42	4	22	19.0	50	M8	10	60	1.490	0.001400
B-48	16	20	48	100	68	104	50	4	22	27.0	50	M8	10	60	1.810	0.001800
B-55	-	25	55	125	83	124	60	4	30	30.0	65	M10	20	-	3.450	0.004600
B-65	0/30	10/32	65	140	96	144	70	4	32	36.0	72	M10	20	-	5.180	0.009900
B-80	-	30	80	175	124	186	90	6	45	46.5	93	M10	20	-	11.50	0.037000
B-100	35	40	100	210	152	228	110	8	55	63.0	102	M12	30	-	20.50	0.115600

## 4.2 DENTEX® tooth coupling, series B4R & B3R

Figure 2: Diagram of the DENTEX® tooth coupling, series B4R with external stop rings and Seeger rings

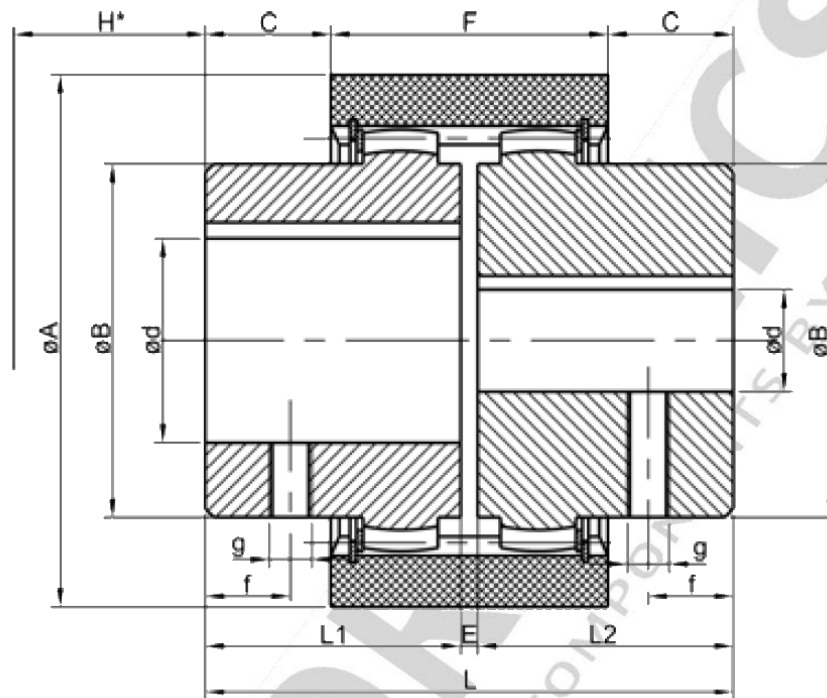
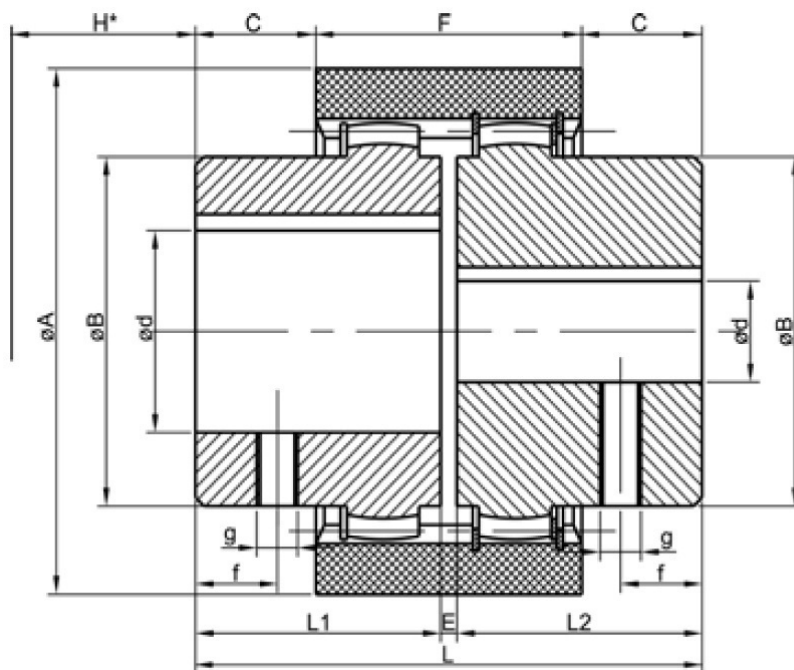


Table 2: Dimensions of the DENTEX® tooth coupling, series B4R

Type	Finish bores												Weight kg	Moment of Inertia kgm <sup>2</sup>
	min.	max.	A	B	L	L1 + L2	E	H*	C	F	g	f		
B4R 32	12	32	84	50	84	40	4	18.0	13.0	58	M8	10	1.1	0.0007
B4R 45	20	42	100	65	88	42	4	18.0	14.0	60	M8	10	1.5	0.0017
B4R 65	25	65	140	96	144	70	4	15.0	30.0	84	M10	20	5.4	0.0118
B4R 80	30	80	175	124	186	90	6	3.5	46.5	93	M10	20	11.7	0.0385
B4R 100	40	100	210	152	228	110	8	-	63.0	102	M12	30	20.8	0.0987

**Figure 3: Diagram of the DENTEX® tooth coupling, series B3R with internal and external Seeger rings**



**Table 3: Dimensions of the DENTEX® tooth coupling, series B3R**

Type	Finish bores													Weight kg	Moment of inertia kgm²
	min.	max.	A	B	L	L1+L2	E	H*	C	F	g	f			
B3R 24	10	24	58	36	56	26	4	23.5	2.5	51	M5	6	0.3	0.0001	
B3R 28	10	28	70	44	84	40	4	26.0	14.0	56	M8	10	0.8	0.0004	
B3R 32	12	32	84	50	84	40	4	27.0	13.0	58	M8	10	1.1	0.0007	
B3R 45	20	42	100	65	88	42	4	28.0	14.0	60	M8	10	1.5	0.0016	
B3R 65	25	65	140	96	144	70	4	40.0	30.0	84	M10	20	5.4	0.0115	
B3R 80	30	80	175	124	186	90	6	45.0	46.5	93	M10	20	11.6	0.0378	
B3R 100	40	100	210	152	228	110	8	49.0	63.0	102	M12	30	20.7	0.0974	



**DENTEX® tooth couplings used with other add-on parts which could produce heat, sparks and static charges (e.g. JOYTORK safety couplings) are not approved for use in Ex-zones. These must be tested in advance.**



## 5.0 Assembly

### 5.1 Assembly instructions



We recommend checking the dimensional accuracy of the hole, shaft, slot and feather key before commencing assembly.



Gently heating the hubs to approx. 80°C makes it easier to fit them onto the shaft.



Touching the heated coupling hubs can cause burns. Wear safety gloves



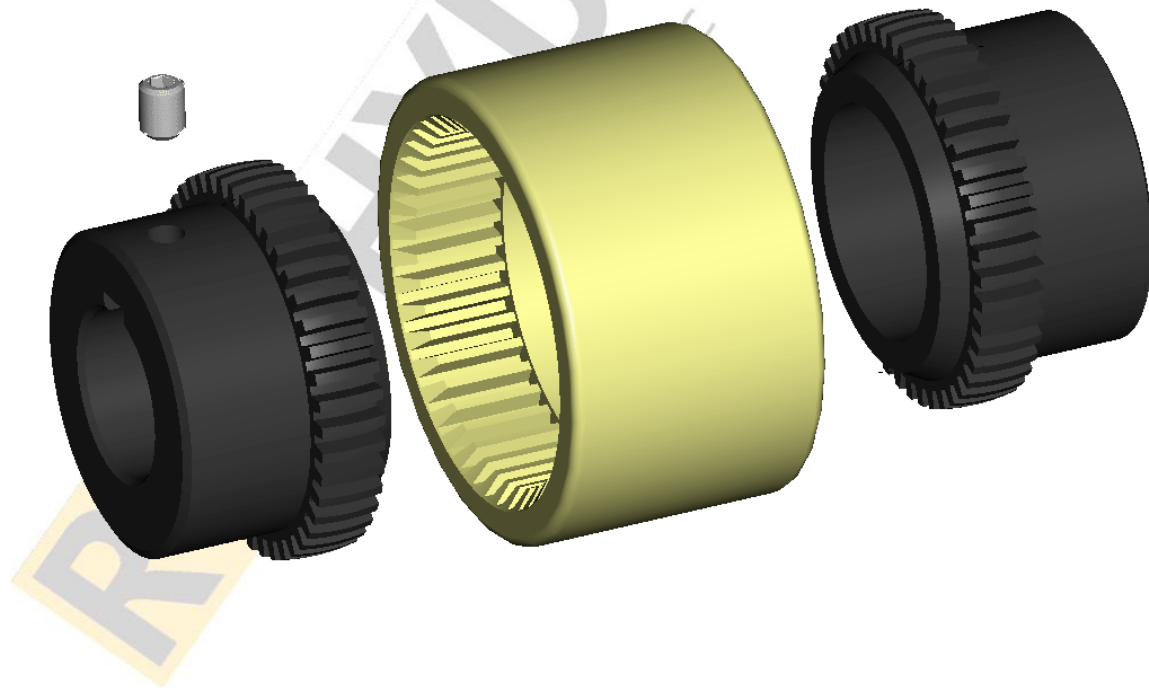
During assembly, make sure that dimension E, see Tables 1-3, is adhered to, so that the coupling sleeve can still move axially during use. If this instruction is not observed, the coupling cannot work properly and may be damaged.



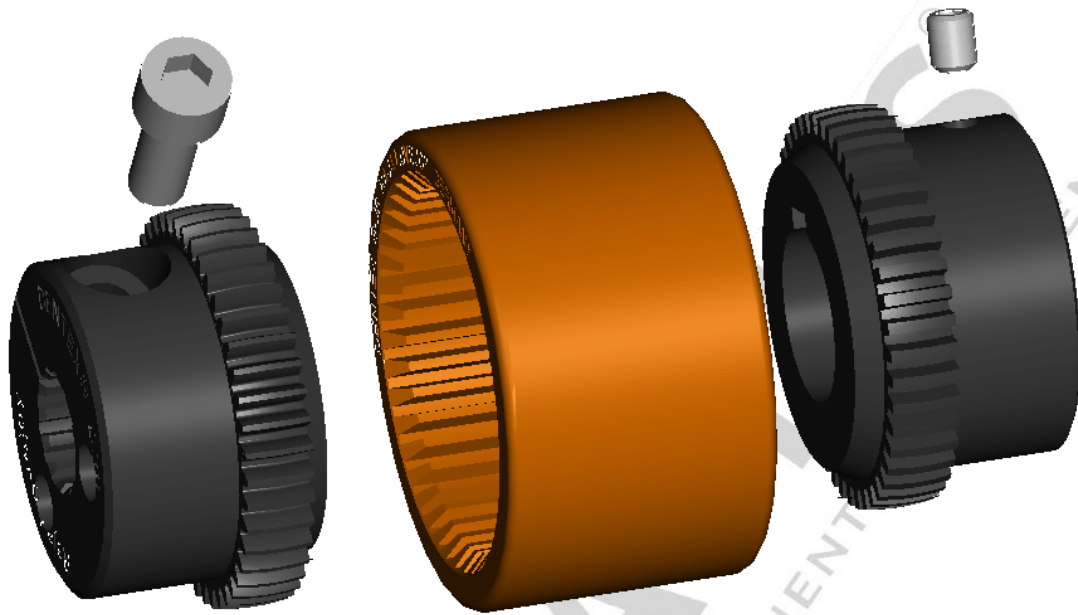
It is vital that you pay attention to hazards from ignition sources in areas where there is a risk of explosion!

### 5.2 Components of the coupling

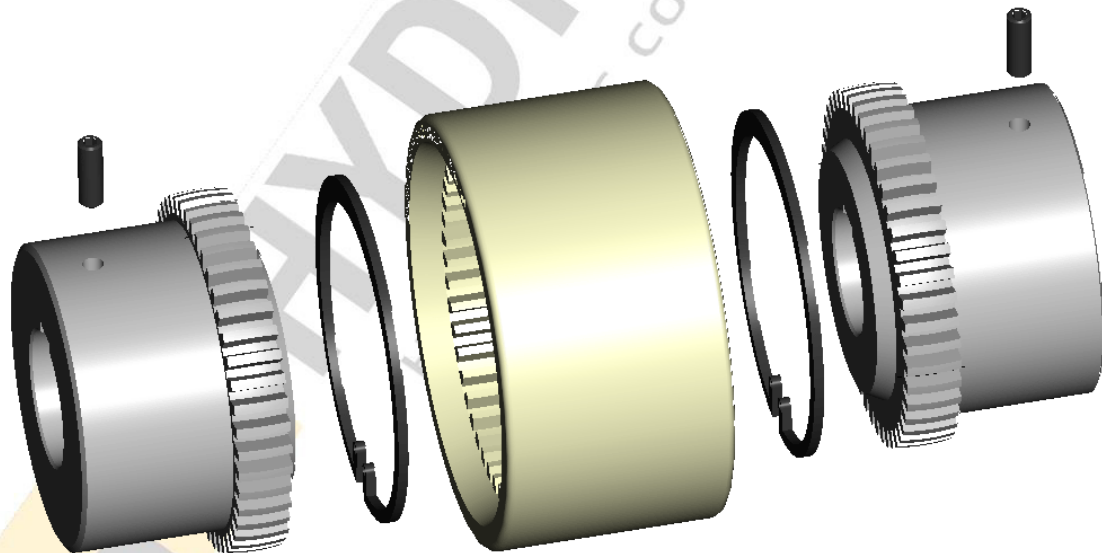
*Figure 4: DENTEX® tooth coupling - assembly*



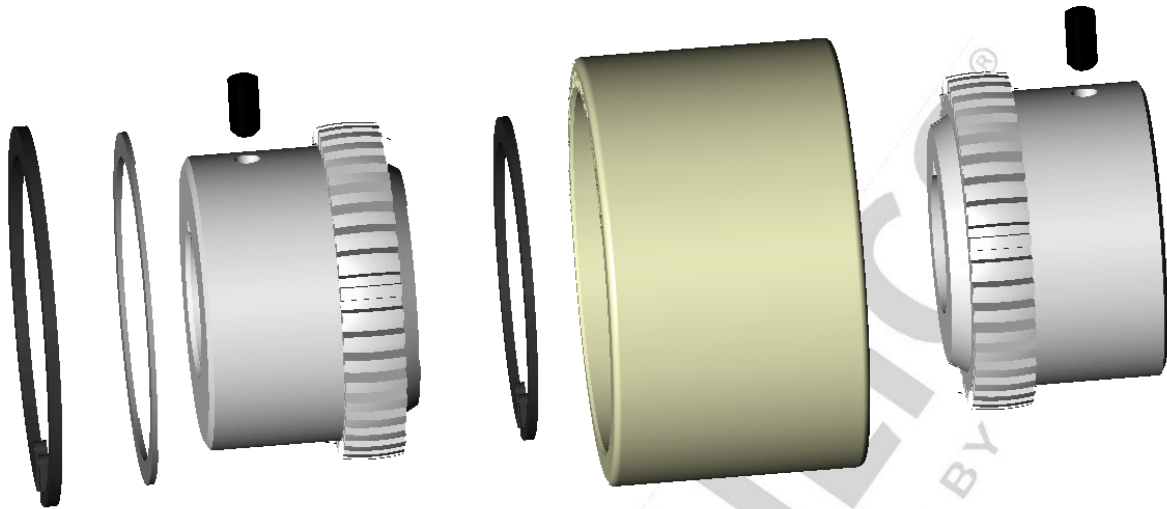
**Figure 5: DENTEX® tooth coupling with clamped design & heat-resistant sleeve - assembly**



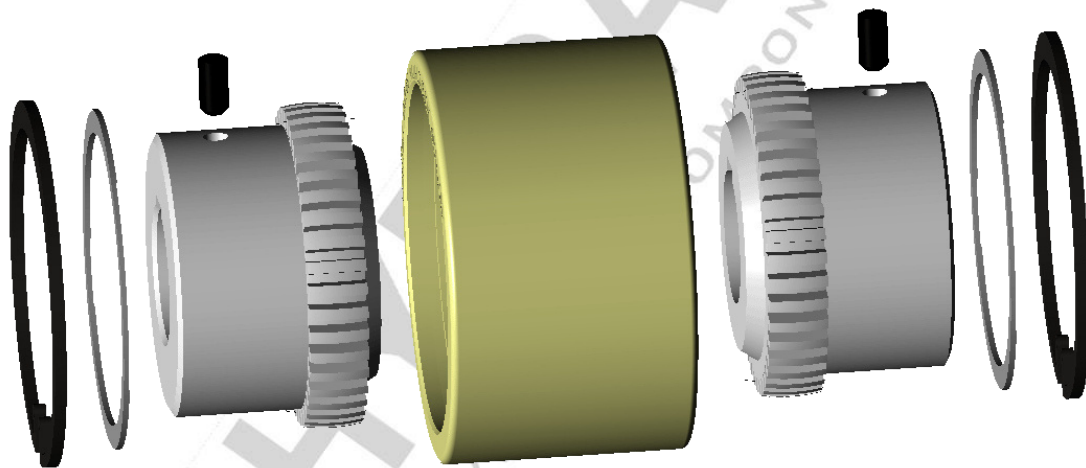
**Figure 6: DENTEX® tooth coupling, size DT55/DT80/DT100 - assembly**



**Figure 7: DENTEX® tooth coupling, type B3R - assembly**



**Figure 8: DENTEX® tooth coupling, type B4R - assembly**



### **5.3 Assembling the DENTEX® coupling**

- Fit the two coupling hubs onto the shafts of the drive and driven side.
- On couplings of the size DT55, DT80 or DT100, fit the two internal retaining rings into the sleeve with a suitable tool.
- Insert the sleeves into the tooth geometry on one of the two sides.
- If you have an assembly drawing, fasten together the two coupling hubs as specified in the drawing. During this process, check dimension E (Figure 1) and if necessary, readjust.
- If not, bring the unit together axially until dimension E (Figure 1) has been achieved.

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- If the units on the motor and pump side are already attached, dimension E (Figure 1) can be set by moving the coupling hubs axially.
- Secure the hubs by tightening the radial threaded pins DIN EN ISO 4029 with cup point. You can find the tightening torques in Table 4.
- If you are fitting a DENTEX® coupling hub with clamped design, you can find the tightening torque in Table 5.

**Table 4: Tightening torques for threaded pins**

Threaded pin DIN EN ISO 4029 with cup point	M4	M5	M6	M8	M10	M12	M16
Tightening torques $T_A$ [ Nm ]	1.5	2	4	10	17	40	80

**Table 5: Tightening torques for clamping screws**

Cheese head screw with hexagonal socket acc. to DIN 912 - 12.9	M8	M10	M16	M20	M24
Tightening torques in GGG / ST - $T_A$ [ Nm ]	25	69	295	410	710

#### **5.4 Additional assembly of the DENTEX® coupling, type B4R**

- The stop rings and retaining rings must be fitted on both sides.
- One stop ring and one retaining ring each must be slid over the cylindrical end of the respective coupling hub. Once the coupling hub has been successfully fitted into the coupling sleeve, slide the stop ring into the coupling sleeve until it is resting against the tothing.
- Then fit the retaining ring into the slot provided in the coupling sleeve, using a suitable tool.
- This assembly process should be repeated on the other side, in the same sequence.

#### **5.5 Additional assembly of the DENTEX® coupling, type B3R**

- In this case, the stop rings and retaining rings must be fitted on one side.
- First fit the internal retaining ring into the slot provided in the coupling sleeve, using a suitable tool.
- Then slide the stop ring and retaining ring over the cylindrical end of the coupling hub. Once the coupling hub has been successfully fitted into the coupling sleeve, slide the stop ring into the coupling sleeve until it is resting against the tothing.
- Then fit the retaining ring into the slot provided in the coupling sleeve, using a suitable tool.

## 5.6 Displacement types and values

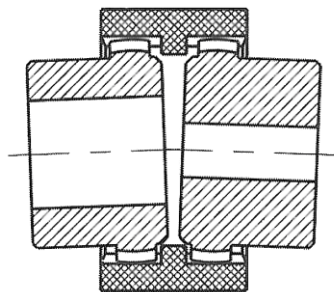


In order to guarantee a long service life for the coupling and to avoid hazards during usage in Ex-zones, the shaft ends must be precisely aligned. It is vital to maintain the specified displacement values, see Table 6. Exceeding these values will damage the coupling. The more precisely the coupling is aligned, the longer its service life will be.

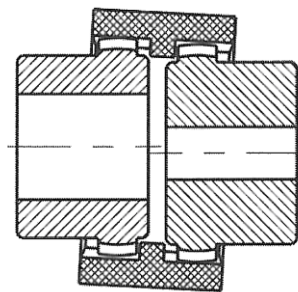


When using the coupling in an Ex-zone for explosion group IIC (designation II 2GD c IIC T X), these displacement values must be halved (see Tables 8 and 9).

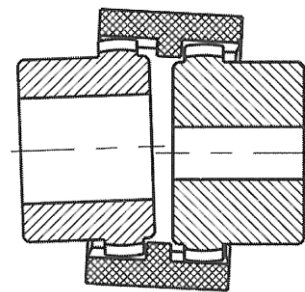
**Figure 9: Displacement types and values**



Displacement angular



Displacement radial



Displacement angular-radial

**Table 6: Displacement values**

Type	Rotation n max [1/min]	Torque [Nm]		Output [kW/min-1]		Max. displacement [mm]		
		Normal T <sub>KN</sub>	Max. T <sub>K</sub>	Normal	Max.	axial	radial or angular	
B-14	8000	10	20	0,0010	0,0021	± 1	± 0,3	± 1 per hub
B-19	8000	16	32	0,0017	0,0033		± 0,4	
B-24	8000	20	40	0,0021	0,0042		± 0,6	
B-28	8000	45	90	0,0047	0,0094		± 0,7	
B-32	7000	60	120	0,0063	0,0130		± 0,8	
B-38	6000	80	160	0,0084	0,0170		± 0,4	
B-42	5400	100	200	0,0100	0,0200			
B-48	5000	140	280	0,0150	0,0290		± 0,6	
B-55	4000	250	500	0,0260	0,0520		± 0,7	
B-65	3800	390	780	0,0410	0,0800		± 0,8	
B-80	3000	700	1400	0,0730	0,1500		± 0,4	
B-100	2400	1250	2400	0,1300	25,000			
B3R	24	10200	20	40	0,0020		0,0040	
	28	8300	45	90	0,0045	0,0095	± 0,7	
	32	7000	80	160	0,0084	0,0170	± 0,8	
B3R	45	5000	140	280	0,0150	0,0290	± 0,4	
	65	3800	390	780	0,0410	0,0800		
B4R	80	3000	700	1400	0,0730	0,1500	± 0,6	
	100	2400	1250	2400	0,1300	25,000	± 0,7	

- The displacement values stated in Table 6 are maximum values, which must not occur at the same time. If radial and angular displacement do occur simultaneously, the permissible displacement values may only be used proportionately.
- Use a measuring gauge, ruler or feeler gauge to check whether the permissible displacement values from Table 6 have been maintained.

## **6.0 Spare parts management & addresses:**



Having important spare parts in stock at the installation location is a basic requirement for ensuring the operational readiness of the coupling.



You can find contact addresses of field service staff or partners for spare parts/orders on the R+L Hydraulics website at [www.rl-hydraulics.com](http://www.rl-hydraulics.com).

## **7.0 Important information for the Ex-area**

If the DENTEX torsionally flexible shaft coupling is operated in or in connection with potentially explosive atmospheres, the following supplementary notes must also be observed. ®

This "Supplement Ex" only applies to the B, B3R and B4R series!

### **Contents of the Ex-area**

## **7.0 Important information for the Ex-area .....14**

### **Contents of the Ex-area .....14**

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## **7.1 Intended operation**

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

### **7.1.1 Explosive atmosphere**

Ambient pressure  $p_a$                       0,8 bis 1,1                      bar(abs)

Oxygen content  $r_{O_2}$                       ca. 21                      Vol-%

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

Excluded are dusts with a minimum ignition energy  $MZE < 1$  mJ, such as sulfur.

It should be noted that Directive 2014/34/EU does not apply to explosive or unstable substances and mixtures.

### **7.1.2 Instructions for use**

The coupling DENTEX series B, B3R or B4R is designed to be ignition source free according to DIN EN ISO 80079-36 or DIN EN ISO 80079-38 according to the specified category. The use of the coupling DENTEX in connection with explosive atmospheres depends on the sleeve material used.


The following approvals apply:

In equipment group I, category M2 or EPL Mb in all sizes with the marking:

CE  I M2 Ex h Mb

$T_a$  according to operating and assembly instructions

In equipment group II, category 2G or EPL Gb in all sizes with the marking:

CE  II 2G Ex h IIC TX Gb

$T_a$  and TX according to operating and assembly instructions

In equipment group II, category 2G or EPL Gb in all sizes with the marking:

CE  II 2G Ex h IIB TX Gb

$T_a$  and TX according to operating and assembly instructions

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In equipment group II, category 2D or EPL Db in all sizes with the marking:

CE  II 2D Ex h IIIC TX Db

T<sub>a</sub> and TX according to operating and assembly instructions

The permissible ambient temperature T<sub>a</sub> as well as the max. surface temperature (for gases and/or dusts) result from the material of the sleeve as follows:

The minimum permissible ambient temperature is:

Material	Ambient- temperatur
6.6 Polyamid	-25 °C ≤ T <sub>a</sub>
heat stab. Polyamid	-25 °C ≤ T <sub>a</sub>
glass fiber rei. Polyamid	-25 °C ≤ T <sub>a</sub>

The maximum permissible ambient temperature is:

Material	Ambient- temperatur
6.6 Polyamid	T <sub>a</sub> ≤ 80 °C
heat stab. Polyamid	T <sub>a</sub> ≤ 140 °C
glass fiber rei. Polyamid	T <sub>a</sub> ≤ 121 °C

The max. surface temperature TX is 25 K higher than the actual local ambient temperature.

The design limits according to the DENTEX Installation and Operating Instructions must be observed. The permissible displacement values must not be exceeded. The installation dimension "E" must be observed. The coupling must not be operated in the range of natural vibrations. Coupling-dependent parameters for calculating natural vibration are contained in the operating and assembly instructions or can be requested from R+L Hydraulics.

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The coupling materials used must not be chemically affected by the surrounding atmosphere. The resistance of the sleeve to a number of chemical substances is specified in the operating and assembly instructions. The resistance of the sleeve to other chemical substances can be checked at the customer's request.

Unacceptable heating of the sleeve can occur if the coupling runs in a dust fill. This must be prevented by the operator.

To prevent mechanical ignition sources, metallic contact with the rotating coupling must be prevented. This can be done, for example, with a suitable coupling guard (fixed separating guard). Openings or gaps in/with the guard must be at least IP 2X according to IEC 60529. In Group I, the coupling guard must be able to withstand the severe operating conditions.

In group I, couplings in aluminum are not offered.

The sleeves are made of a normally flammable material. Up to size B55, the weight of the sleeve is less than 0.5 kg. For larger couplings, the fire risk must be assessed by the operator.

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## 7.2 Health and safety information



If the DENTEX coupling is used as part of an installation, the operator of the installation must comply with the requirements of Directive 1999/92/EC and, if applicable, any national requirements that go beyond this.

If the DENTEX coupling is used as part of an installation, the operator of the installation must comply with the requirements of Directive 1999/92/EC and, if applicable, any national requirements that go beyond this.

It is the responsibility of the operator to check whether the coupling DENTEX is suitable for operation in the actually existing potentially explosive atmosphere based on the instructions for use.

In fault-free operation the coupling DENTEX does not show any effective ignition sources. The operator must ensure trouble-free operation by inspection, maintenance and repair in accordance with the operating and mounting instructions.

The operator must shut down a coupling which is not functioning properly. The coupling must not be put into operation again until it has been repaired.

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No burning, welding or cutting work is normally required for maintenance and repair.

For work in potentially explosive atmospheres, protective measures must be taken by the operator in accordance with Directive 1999/92/EC, e.g. DIN EN 1127 1 Appendix A. Smoking, fire and naked lights are to be prohibited.

### **7.3 Installation and assembly**



The coupling halves must be secured against axial displacement. If the coupling halves are not mounted against a shaft shoulder, they must be secured with a locking screw. The locking screw must be secured against loosening with an adhesive, Loctite 243 or equivalent.

To reliably prevent metallic contact, the coupling halves must be mounted with the specified distance "E".

All screws must be tightened to the specified torque.

Equipotential bonding between the shaft journals must be ensured on the plant side.

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## 7.4 Control, inspection and repair



To prevent and detect malfunctions, the following instructions must be observed in addition to the inspection instructions in the operating and assembly instructions.

Malfunctions must be eliminated immediately by following the maintenance instructions.

In daily inspections, pay attention to any changes in running noises or vibrations that occur.

The sleeve can wear due to friction, so that an unacceptable hot surface can form as a result of parts twisting against each other. For this reason, wear must be checked regularly in accordance with the operating and assembly instructions. Before impermissible wear occurs, the sleeve must be replaced.

To maintain the explosion protection concept, only spare parts specified by the manufacturer may be utilized.

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## 7.5 Testing



In accordance with Directive 1999/92/EC, the DENTEX coupling must be checked for correct installation and proper functioning by a competent person or by R+L Hydraulics or an authorized R+L Hydraulics representative before it is put into operation. This check must be documented.

In accordance with BetrSichV, the DENTEX coupling must be checked for proper functioning by a competent person or by R+L Hydraulics or an authorized R+L Hydraulics representative at least every 3 years. This inspection must be documented.

## 7.6 Supplementary information



In case of any subsequent machining of the coupling components, not carried out by R+L Hydraulics GmbH, the customer bears the sole responsibility.

Customer bears the sole responsibility.

Any warranty claims are excluded.



Any reworking of coupling components which are intended for use in the in hazardous areas, which have not been carried out by R+L Hydraulics GmbH have been carried out, will immediately void the Ex-suitability.

Furthermore, the customer bears the sole responsibility.

Any warranty claims are excluded.

## 7.7 Declaration of conformity according to RL 2014/34/EU

Below is the EC Declaration of Conformity for R+L Hydraulics from the DENTEX coupling. The customer can choose to receive the Declaration of Conformity with the delivery of the coupling or by e-mail.

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## Declaration of conformity

As defined in the explosion protection directive 2014/34/EU

The following company: R+L Hydraulics GmbH  
Friedrichstrasse 6  
58791 Werdohl

hereby declares at its sole responsibility that the

device: **DENTEX clutch**

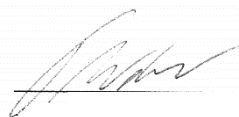
complies with the basic health and safety requirements of Directive **RL 2014/34/EU**, Annex II. The possible uses are derived from the labeling and the instructions for use in the "Ex" supplement to the assembly and operating instructions.

The following harmonized standards and/or normative documents have been considered, in whole or in part, with the design and manufacturing of this device:

European Standards	National standards / normative documents
DIN EN 1127-1:2011 DIN EN 15198:2007 DIN EN ISO 80079-36:2016 DIN EN ISO 80079-38:2017 DIN EN ISO 80079-37:2017	

The special notes in the "Ex supplement" for operating and assembly instructions must be observed.

The technical documentation referred to in Annex VIII, No. 3 has been prepared and filed with the notified body **IBExU**. The filing number is **IB034179 E3**.



Werdohl, 28.08.2023  
Place / Date

**Timo Weber / General Manager**  
Name / Function / Signature

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