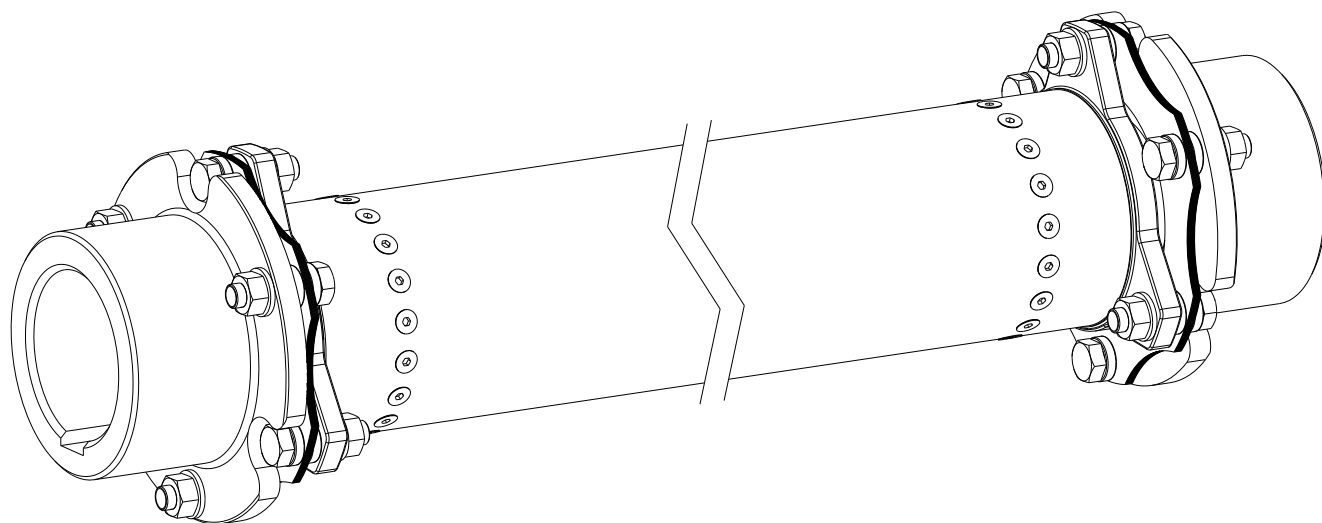


RADEX®-N Composite



RADEX®-N is a torsionally stiff flexible steel lamina coupling. It is able to compensate for shaft misalignment, for example caused by thermal expansion, etc.

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1 Technical data

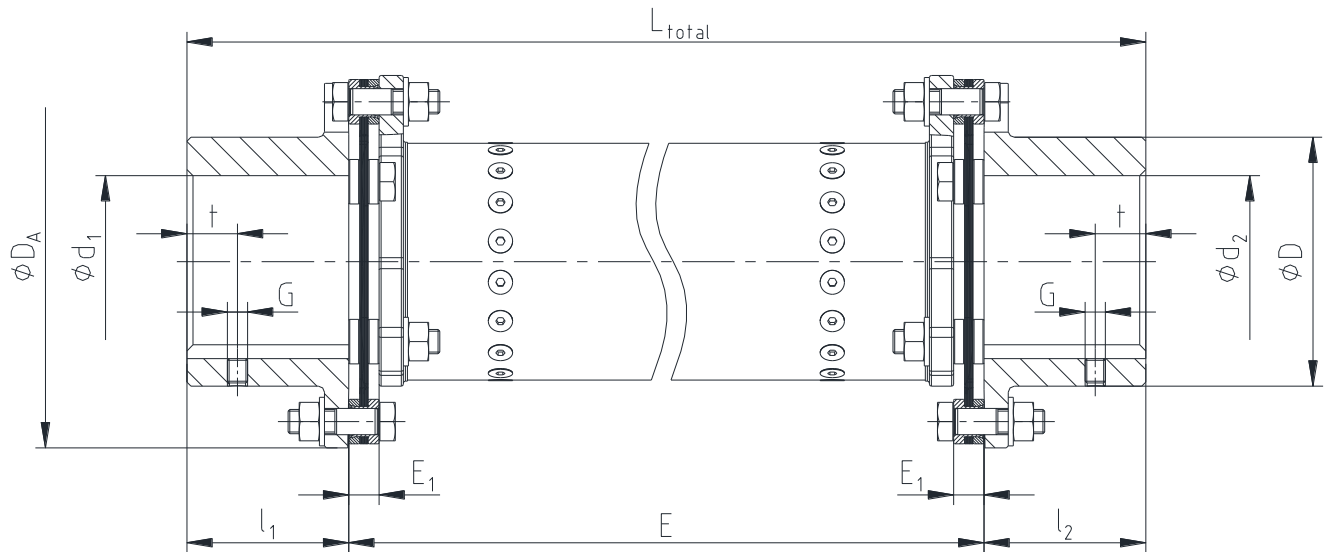


Illustration 1: RADEX®-N Composite

Table 1: Dimensions

RADEX®-N Size	Max. finish bore d ₁ , d ₂ [mm]	Dimensions [mm]								
		General						Setscrew		
		D	D _A	l ₁ , l ₂	L _{total}	E ₁	E	G	t	T _A [Nm]
70	70	102	149	65	l ₁ +l ₂ +E	11	According to customer specification	M10	20	14
85	85	123	184	80		15		M10	25	14
90	90	135	200	80		15		M12	25	35
115	115	163	253	100		23		M12	30	35

Table 2: Coupling data

RADEX®-N size		70	85	90	115
Torque [Nm]	T _{KN}	800	1800	2500	4500
	T _{K max}	1600	3600	5000	9000
	T _{KW}	265	600	830	1500
Speed [rpm]	n	Max. speed depending on dimension E - please consult with company KTR			
Operating temperature [°C]	t	-30 to +100			



Please observe maximum speed and operating temperature.

1 Technical data

The displacement figures specified in table 3 provide for sufficient safety to compensate for external influences like, for example, thermal expansion or foundation settling.



In order to ensure a long service life of the coupling, the shaft ends have to be accurately aligned (see chapter 4.4). The displacement figures specified in table 3 are maximum figures which must not arise in parallel. If the figures are exceeded, the coupling will be damaged. The more accurate the alignment of the coupling, the longer is its service life.

Please note:

- The displacement figures specified in table 3 are maximum figures which must not arise in parallel. If radial, axial and angular displacement arises at the same time, these values must be reduced (see illustration 3).

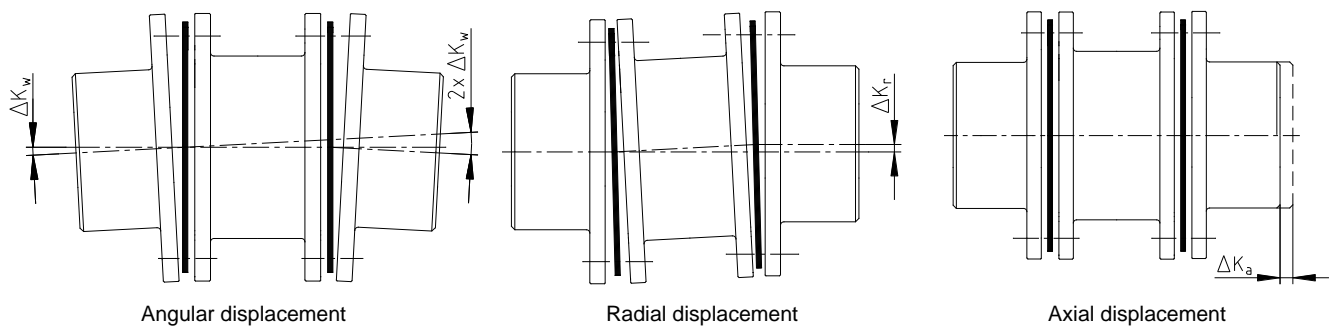


Illustration 2: Displacements

Examples of the displacement combinations specified in illustration 3:

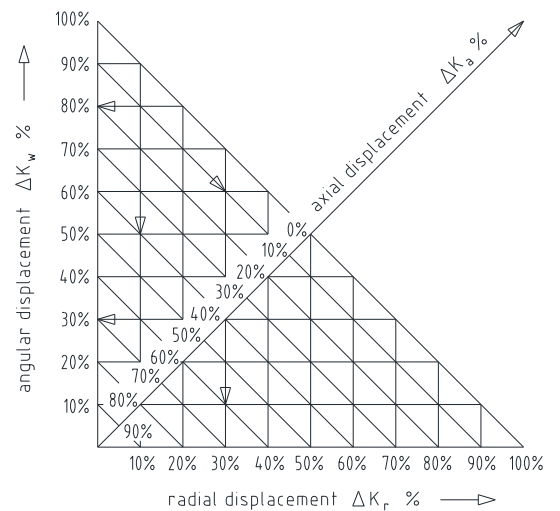
Example 1:

- $\Delta K_r = 10\%$
- $\Delta K_w = 80\%$
- $\Delta K_a = 10\%$

Example 2:

- $\Delta K_r = 30\%$
- $\Delta K_w = 30\%$
- $\Delta K_a = 40\%$

Illustration 3: Combinations of displacement



$$\Delta K_{total} = \Delta K_a + \Delta K_r + \Delta K_w \leq 100 \%$$

Table 3: Displacement figures

RADEX®-N size	Max. angular displacement ¹⁾ $\Delta K_w [^\circ]$	Max. radial displacement $\Delta K_r [mm]$	Max. axial displacement $\Delta K_a [mm]$
70	1.3	$0.0226 \times (E - 11)$	± 2.2
85	1.3	$0.0226 \times (E - 15)$	± 2.3
90	1.0	$0.0174 \times (E - 15)$	± 2.0
115	1.0	$0.0174 \times (E - 23)$	± 2.8

1) each lamina set

2 Advice

2.1 General advice

Please read through these operating/assembly instructions carefully before you start up the coupling. Please pay special attention to the safety instructions!

The operating/assembly instructions are part of your product. Please store them carefully and close to the coupling. The copyright for these operating/assembly instructions remains with KTR.

2.2 Safety and advice symbols



Warning of personal injury

This symbol indicates notes which may contribute to preventing bodily injuries or serious bodily injuries that may result in death.



Warning of product damages

This symbol indicates notes which may contribute to preventing material or machine damage.



General advice

This symbol indicates notes which may contribute to preventing adverse results or conditions.



Warning of hot surfaces

This symbol indicates notes which may contribute to preventing burns with hot surfaces resulting in light to serious bodily injuries.

2.3 General hazard warnings



With assembly, operation and maintenance of the coupling it has to be made sure that the entire drive train is secured against accidental switch-on. You may be seriously hurt by rotating parts. Please make absolutely sure to read through and observe the following safety notes.

- All operations on and with the coupling have to be performed taking into account "safety first".
- Please make sure to switch off the power pack before you perform your work on the coupling.
- Secure the power pack against accidental switch-on, e. g. by providing warning signs at the place of switch-on or removing the fuse for current supply.
- Do not reach into the operating area of the coupling as long as it is in operation.
- Please secure the coupling against accidental contact. Please provide for the necessary protection devices and covers.

2.4 Intended use

You may only assemble, operate and maintain the coupling if you

- have carefully read through the operating/assembly instructions and understood them
- are technically qualified and specifically trained (e. g. safety, environment, logistics)
- are authorized by your company

The coupling may only be used in accordance with the technical data. Unauthorized modifications on the coupling design are not admissible. We will not assume liability for any damage that may arise. In the interest of further development we reserve the right for technical modifications.

The **RADEX®-N** coupling described in here corresponds to the technical status at the time of printing of these operating/assembly instructions.

**2 Advice****2.5 Coupling selection**

For a long-lasting and failure-free operation of the coupling it must be selected according to the selection instructions (according to DIN 740 part 2) for the particular application (see RADEX®-N catalogue).

If the operating conditions (performance, speed, modifications on engine and machine) change, the coupling selection must be reviewed.

Please make sure that the technical data regarding torque refer to the lamina set only. The transmittable torque of the shaft-hub-connection must be reviewed by the customer and is subject to his responsibility.

For drives subject to torsional vibrations (drives with cyclic stress due to torsional vibrations) it is necessary to perform a torsional vibration calculation to ensure a reliable selection. Typical drives subject to torsional vibrations are e. g. drives with diesel engines, piston pumps, piston compressors etc. If requested, KTR will perform the coupling selection and the torsional vibration calculation.

2.6 Reference to EC Machinery Directive 2006/42/EC

The couplings supplied by KTR should be considered as components, not machines or partly completed machines according to EC Machinery Directive 2006/42/EC. Consequently KTR does not have to issue a declaration of incorporation. For details about safe assembly, start-up and safe operation refer to the present operating/assembly instructions considering the warnings.

3 Storage, transport and packaging**3.1 Storage**

The couplings are supplied in preserved condition and can be stored at a dry and covered place for 6 - 9 months.



Humid storage rooms are not suitable.

Please make sure that condensation is not generated. The best relative air humidity is less than 65 %.

3.2 Transport and packaging

In order to avoid any injuries and any kind of damage always make use of proper transport and lifting equipment.

The couplings are packed differently each depending on size, number and kind of transport. Unless otherwise contractually agreed, packaging will follow the in-house packaging specifications of KTR.



4 Assembly

The coupling is generally supplied in individual parts. Before assembly the coupling has to be inspected for completeness.

4.1 Components of the couplings

Components of RADEX®-N Composite

Component	Quantity	Subassembly
1	2	Flange hub
2	1	Spacer with CFK pipe
2.1	2	Screw plug
3	2	Lamina set
4	see table 4	Dowel screw
5		Spacer sleeve
6		Washer
7		Hexagon nut
8	2	Setscrew DIN EN ISO 4029

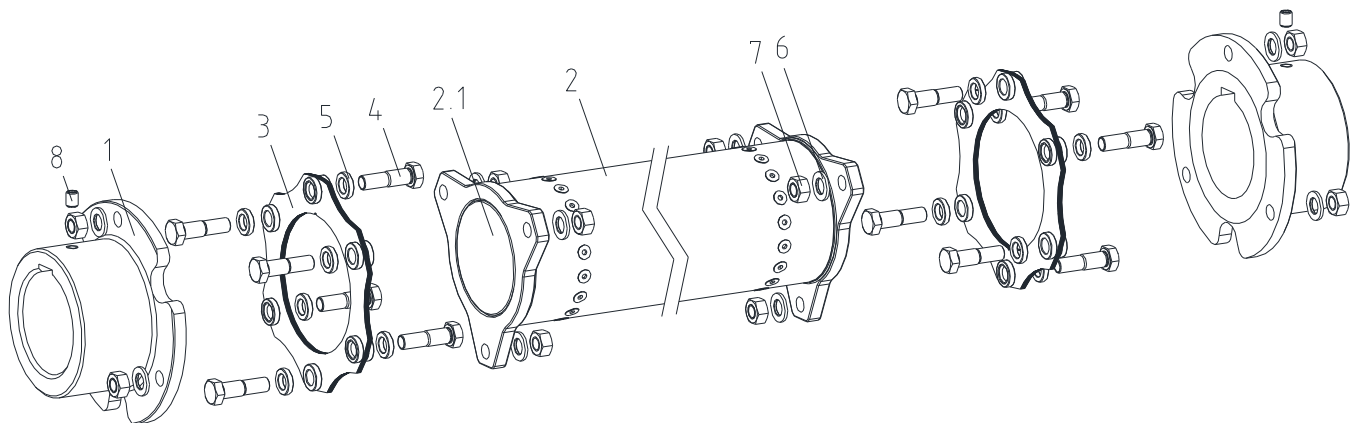


Illustration 4 RADEX®-N Composite



The sealing plugs (component 2.1) on the spacer ends (component 2) are necessary to prevent penetration of water or other foreign objects. This is not a transport lock and must not be removed.

Table 4: Number of single parts

RADEX®-N size	70	85	90	115
Fit bolts (component 4) ¹⁾	6	6	6	6
Spacer sleeves (component 5) ¹⁾	6	-	-	-
Washers (component 6) ¹⁾	-	6	6	6
Hexagon nuts (component 7) ¹⁾	6	6	6	6

1) each lamina set

Please observe protection note ISO 16016.	Drawn: 2019-09-19 Pz/Wig	Replacing: KTR-N dated 2015-05-06
	Verified: 2019-09-20 Pz	Replaced by:

**4 Assembly****4.2 Advice for finish bore**

The maximum permissible bore diameters d (see chapter 1 - technical data) must not be exceeded. If these figures are disregarded, the coupling may tear. Rotating particles may cause danger to life.

- Bores of flange hubs machined by the customer have to observe concentricity or axial runout, respectively (see illustration 5).
- Please make absolutely sure to observe the figures for $\varnothing d_{\max}$.
- Carefully align the flange hubs when the finish bores are drilled.
- Please provide for a setscrew according to DIN EN ISO 4029 with a cup point or an end plate to fasten the flange hubs axially.

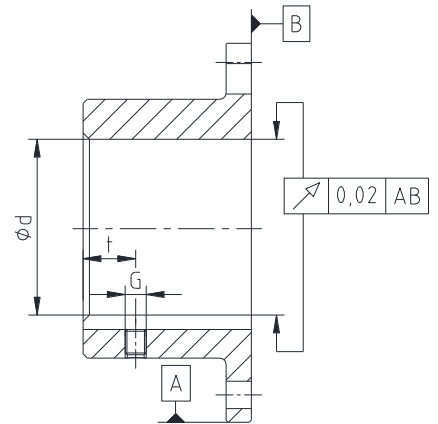


Illustration 5: Concentricity and axial run-out



The customer bears the sole responsibility for all machining processes performed subsequently on unbored or pilot bored as well as finish machined coupling components and spare parts. KTR does not assume any warranty claims resulting from insufficient remachining.

Table 5: Setscrew DIN EN ISO 4029

RADEX®-N size	70	85	90	115
Dimension G [mm]	M10	M10	M12	M12
Dimension t [mm]	20	25	25	30
Tightening torque T_A [Nm]	14	14	35	35

4.3 Assembly/disassembly of flange hubs

We recommend to inspect bores, shaft, keyway and feather key for dimensional accuracy before assembly.



Heating the flange hubs lightly (approx. 80 °C) allows for an easier mounting onto the shafts.



Touching the heated flange hubs causes burns. Please wear safety gloves.



With the assembly please make sure that the distance dimension E (see table 1) is observed so that the coupling components are not in contact with each other during the operation. Disregarding this advice may cause damage to the coupling.

4 Assembly

4.3 Assembly/disassembly of flange hubs

For the axial alignment of the coupling the distance dimension E (see table 1) is decisive. In order to set the right dimension E you should proceed as follows:

- Mount the hubs on the shaft of driving and driven side (see illustration 6).
- The internal sides of the flange hubs must be flush with the front sides of the shafts.
- Shift the power packs in axial direction until the distance dimension E is achieved (see table 1).
- Fasten the flange hubs by tightening the setscrews DIN EN ISO 4029 with a cup point (see table 1 or 5).

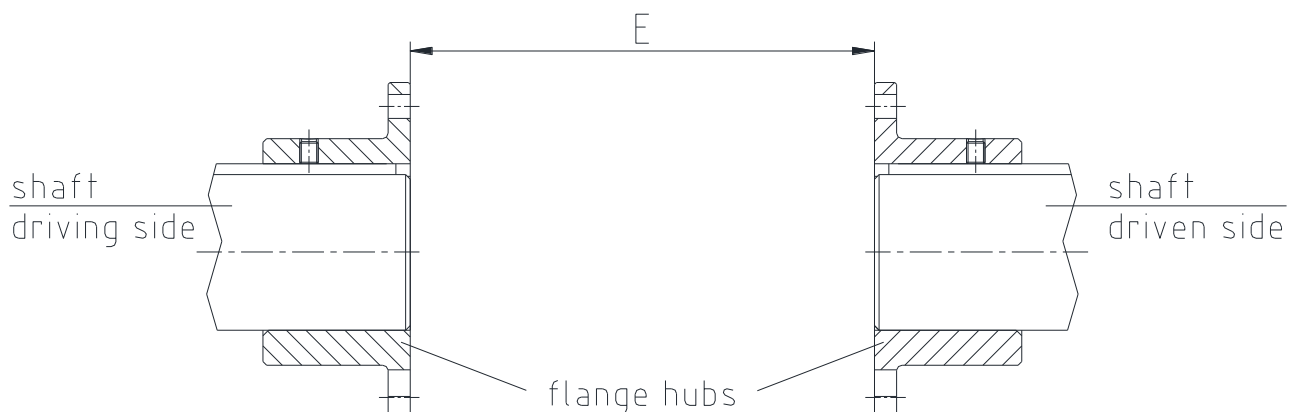


Illustration 6: Assembly of flange hubs

Disassembly:



Driving components falling down may cause injury to persons or damage on the machine. Secure the driving components during disassembly.

- Release the setscrew in the hub and unscrew it by 2 - 3 pitches.
- Pull the hub from the shaft.

4.4 Assembly of lamina sets



With the assembly please make sure that the lamina sets are installed free from distortion in axial direction. Disregarding this advice may cause damage to the coupling.



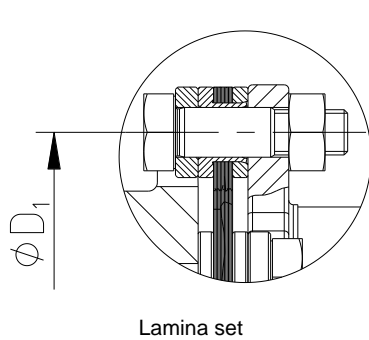
We recommend to additionally secure all setscrews to fasten the flange hubs as well as all screw connections against working loose, e. g. conglutinating with Loctite (medium strength).

- Clean and degrease the contact surfaces of screw connections on the flange hub, lamina set and spacer.
- Insert the lamina sets and the spacer (see illustration 7 or 8).
- Hand-tighten the components for the time being, the fit bolts to be assembled reciprocally (see illustration 7 or 8, respectively).
- Tighten the hexagon nuts one after the other and with several revolutions to the tightening torque specified in table 7. Secure the dowel screws against twisting.



4 Assembly

4.4 Assembly of lamina sets



Lamina set

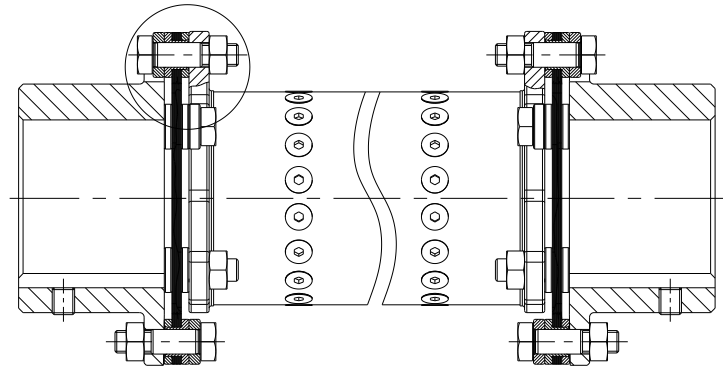
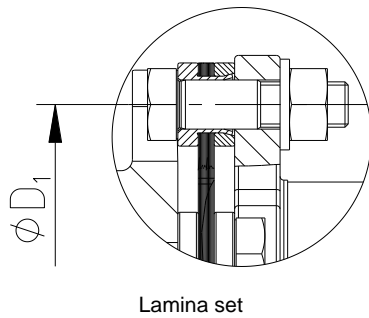


Illustration 7: Assembly of lamina sets, RADEX®-N size 70



Lamina set

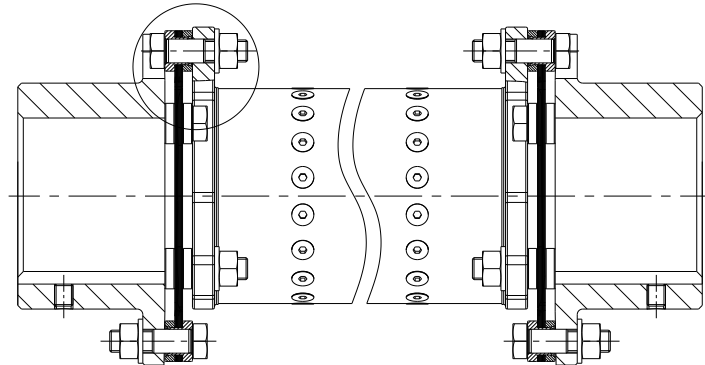


Illustration 8: Assembly of lamina sets, RADEX®-N size 85 - 115

Table 6: Pitch circle diameter and tightening torques

RADEX®-N size	70	85	90	115
Pitch circle ϕD_1 [mm]	128	158	170	214
Screw size	M10	M12	M16	M20
Tightening torque T_A [Nm]	49	86	210	410



Having started up the coupling, the tightening torque of the dowel screws has to be inspected at regular maintenance intervals.



4 Assembly

4.5 Alignment of the coupling

Determine the minimum and maximum distance dimension ($X_{min.}$ and $X_{max.}$) of the external flange surfaces on the finish-assembled coupling (see illustration 9) by measurements, as shown in illustration 10, at the measuring points indicated (see illustration 11). Afterwards turn the drive train by 180° and repeat the measurements. If a value measured falls below the minimum figure or exceeds the maximum figure (see table 8), the drive or driven side should be aligned more accurately.

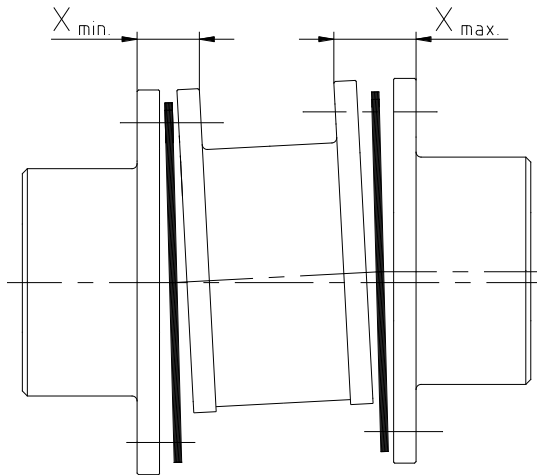


Illustration 9: Measuring of existing distance dimensions

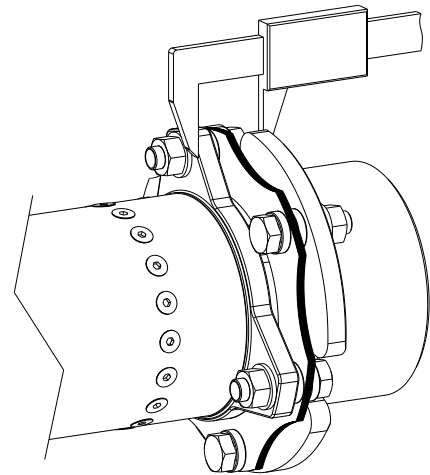


Illustration 10: Measuring process

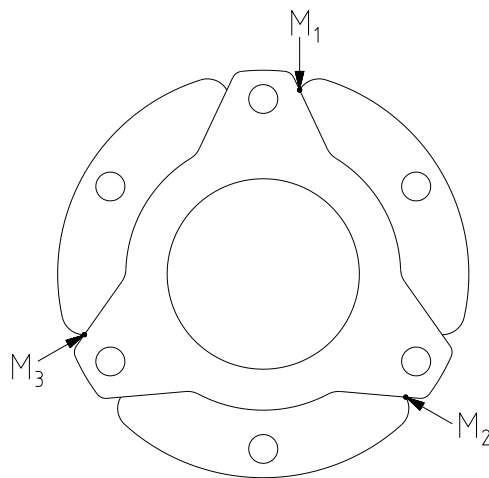


Illustration 11: Measuring points

Table 7: Limiting values for alignment

RADEX®-N size	70	85	90	115
Nominal distance dimension X [mm]	29	39	41	59
Distance dimension $X_{min.}$ [mm]	28.6	38.5	40.5	58.4
Distance dimension $X_{max.}$ [mm]	29.4	39.5	41.5	59.6

**5 Start-up**

Before start-up of the coupling, inspect the tightening of the setscrews in the flange hubs, the alignment and the distance dimension E and adjust, if necessary, and also inspect all screw connections for the tightening torques specified.



We recommend to additionally secure all setscrews to fasten the flange hubs as well as all screw connections against working loose, e. g. conglomerating with Loctite (medium strength).

Finally the coupling protection against accidental contact must be fitted.

Finally the coupling protection against accidental contact must be fitted. It is required in accordance with DIN EN ISO 12100 (Safety of Machinery) and directive 2014/34/EU and must protect against

- access with a little finger
- falling down of solid foreign objects.

The cover may provide for openings intended for necessary heat dissipation. These openings have to comply with DIN EN ISO 13857.

The cover must be electrically conductive and included in the equipotential bonding. Bellhousings (magnesium share below 7.5 %) made of aluminium and damping rings (NBR) can be used as connecting element between pump and electric motor. The cover may only be taken off with standstill of the unit.

During operation of the coupling, please pay attention to

- different operating noise
- vibrations occurring.



If you note any irregularities with the coupling during operation, the drive unit must be switched off immediately. The cause of the breakdown must be specified by means of the table „Breakdowns“ and, if possible, be eliminated according to the proposals. The potential breakdowns specified can be hints only. To find out the cause all operating factors and machine components must be considered.

6 Breakdowns, causes and elimination

The below-mentioned failures can result in a use of the **RADEX®-N** coupling other than intended. In addition to the specifications given in these operating/assembly instructions make sure to avoid such failures.

The errors listed can only be clues to search for the failures. When searching for the failure the adjacent components must generally be considered.

General failures with use other than intended:

- Important data for the coupling selection are not forwarded.
- The calculation of the shaft-hub-connection is not considered.
- Coupling components with damage occurred during transport are assembled.
- If the heated hubs are assembled, the permissible temperature is exceeded.
- The clearance of the components to be assembled is not coordinated with one another.
- Tightening torques have been fallen below/exceeded.
- Components are mixed up by mistake/assembled incorrectly.
- A wrong or no lamina set is inserted in the coupling.
- No original KTR components (purchased parts) are used.
- Maintenance intervals are not observed.

**6 Breakdowns, causes and elimination**

Breakdowns	Causes	Elimination
Different operating noise and/or vibrations occurring	Misalignment	<ol style="list-style-type: none"> 1) Set the unit out of operation 2) Eliminate the reason for the misalignment (e. g. loose foundation bolts, breaking of the engine mount, heat expansion of unit components, modification of the installation dimension E of the coupling) 3) For inspection of wear see item inspection
	Dowel screws working loose, low micro friction under the screw head and on the steel lamina set	<ol style="list-style-type: none"> 1) Set the unit out of operation 2) Inspect coupling components and replace coupling components that have been damaged 3) Tighten the dowel screws to the tightening torque specified 4) Inspect alignment, adjust if necessary
	Screws for axial fastening of flange hubs working loose	<ol style="list-style-type: none"> 1) Set the unit out of operation 2) Inspect alignment of coupling 3) Tighten the screws to fasten the flange hubs and secure against working loose 4) For inspection of wear see item inspection
Breaking of steel lamina set	Breaking of steel lamina set due to high impact energy/overload	<ol style="list-style-type: none"> 1) Set the unit out of operation 2) Disassemble the coupling and remove remainders of the steel lamina sets 3) Inspect coupling components and replace coupling components that have been damaged 4) Insert steel lamina sets, assemble coupling components 5) Find out the reason for overload
	Operating parameters do not meet with the performance of the coupling	<ol style="list-style-type: none"> 1) Set the unit out of operation 2) Review the operating parameters and select a bigger coupling (consider mounting space) 3) Assemble new coupling size 4) Inspect alignment
Breaking of steel lamina set	Operating error of the unit	<ol style="list-style-type: none"> 1) Set the unit out of operation 2) Disassemble the coupling and remove remainders of the steel lamina sets 3) Inspect coupling components and replace coupling components that have been damaged 4) Insert steel lamina sets, assemble coupling components 5) Instruct and train the service staff
Cracks in/fracture of the steel lamina sets/ fastening screws	Vibrations of drive	<ol style="list-style-type: none"> 1) Set the unit out of operation 2) Disassemble the coupling and remove remainders of the steel lamina sets 3) Inspect coupling components and replace coupling components that have been damaged 4) Insert steel lamina sets, assemble coupling components 5) Inspect alignment, adjust if necessary 6) Find out the reason for vibrations



7 Environment and disposal

7.1 Environment

In the interest of the environment our products comply with directive EC 1907/2006 (REACH). Any substances specified in the REACH SVHC list in an impermissible concentration are not used.

7.2 Disposal

In respect of environmental protection we would ask you to dispose of the packaging or products on termination of their service life in accordance with the legal regulations and standards that apply, respectively.

- **Metal**
Any metal components have to be cleaned and disposed of by scrap metal.
- **CFK (carbon fibre reinforced nylon)**
Components made of CFK have to be collected and disposed of by a waste disposal company.

8 Maintenance and service

RADEX®-N is a low-maintenance coupling. We recommend to perform a visual inspection on the coupling **at least once a year**. Please pay special attention to the condition of the lamina sets, alignment and screw connection of the coupling.

- Since the flexible machine bearings of the driving and driven side settle during the course of load, inspect the alignment of the coupling and re-align the coupling, if necessary.
- If some individual laminas are broken, the lamina sets of the coupling have to be replaced. The coupling components have to be inspected for damages.
- The screw connections have to be inspected visually.



After start-up of the coupling the tightening torques of the screws of the lamina sets have to be inspected during usual maintenance intervals.

9 Spares inventory, customer service addresses

We recommend to store major spare parts on site to ensure the readiness for use of the machine in case if a coupling fails.

Contact addresses of the KTR partners for spare parts and orders can be obtained from the KTR homepage at www.ktr.com.



KTR does not assume any liability or warranty for the use of spare parts and accessories which are not provided by KTR and for the damages which may incur as a result.

Please observe protection note ISO 16016.	Drawn:	2019-09-19 Pz/Wig	Replacing:	KTR-N dated 2015-05-06
	Verified:	2019-09-20 Pz	Replaced by:	