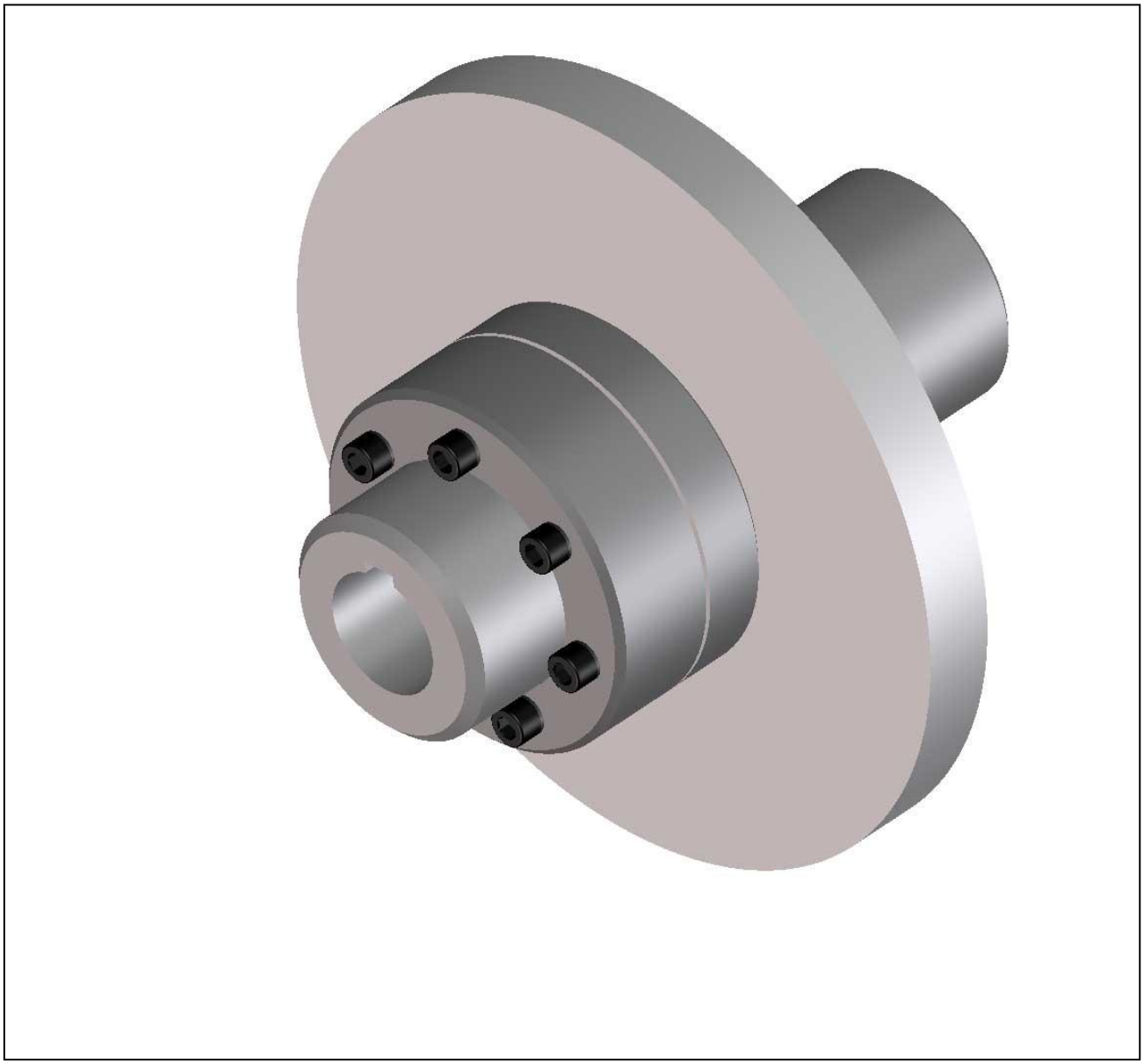
BAWN 015-GBR-3
09/2011

Assembly and operating instructions TSCHAN®
Flexible coupling

Nor-Mex® GHBS / GHBT



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1 Notes on safety

The present assembly and operating instruction (AOI) constituents a part of the coupling supply. Always keep the AOI near the coupling well accessible.
The German version of this manual is the predominant and binding version.

Make sure that all persons charged with the assembly, operating, service, and maintenance have read and understood the AOI and follow all the points:
- Avert hazards for body and live of the user and third parties.
- Ensure the operating safety of the coupling.
- Avoid the loss of use and environmental impairment through false handling.

In the case of transport, mounting, dismounting and maintenance, attention is to be paid to the relevant regulations for industrial safety and for environmental care.

The coupling may only be operated, mounted, serviced and maintained by authorised and trained personnel.

The user must take into account that the bolting elements of coupling parts may be adversely affected by the heat produced by a brake disk/ brake drum due to the resultant friction. Make

sure that the combination of the employed brake lining with the material of the brake disk/ brake drum does not lead to sparks or impermissible thermal growth. The brake disk is normally made of steel, and the brake drum is normally made of cast iron with nodular graphite. In case of any doubt, please consult the supplier!

In the interest of further development, we reserve the right to make changes which serve technological progress.

By the use of accessories and spare parts, which were not originally manufactured by TSCHAN GmbH, we are not responsible for any resulting damage or liability or guarantee.

2 Function

The coupling Nor-Mex® GHBS / GHBT is a torsionally flexible and puncture-proof claw coupling that is mainly used in drive applications as a connection between the high-speed coupling and the gearbox of belt conveyors.
It compensates angular, radial, and axial shaft misalignments within defined limits. The coupling transfers the torque via pressure loadable, elastic buffers of Perbunan (Pb) which are joined together as an intermediate ring.
The elastic intermediate ring can cushion impacts and torsional vibrations; it is oil-tight and electrically conductive.
The wear parts, i.e. the elastic intermediate ring and the brake disk, can be replaced without having to axially displace the machines.
The coupling is usable in every sense of rotation and installation position.

2.1 Appropriate Use

- In order to ensure a faultless, lasting operation of the coupling it must be laid out according to the layout instructions e.g. DIN 730 part 2 (or also catalogue Nor-Mex ®) with an operating facture corresponding to the operating conditions.
- The coupling must only be operated in normal industrial atmospheres. Since aggressive media may attack the coupling components, screws and elastic buffer rings, they represent a risk for the operational safety of the coupling. Consult TSCHAN GmbH in such cases.
- Apart from incorporating a finished bore hole with parallel key groove (see “7.2 Finished borehole”) no further changes can be carried out on the coupling.
- The coupling may only be used within the framework of the conditions defined in the performance and delivery contract.
- Every change of the conditions of use or the operating parameters necessitates a new verification of the coupling layout.

3 Marking of the coupling

The product line Nor-Mex ® has its hardness in Shore (A) indicated on the elastic intermediate ring.

4 Storage

On receipt of the goods, the supply is to be checked immediately for completeness and correctness. Possible damages incurred during transit and / or missing parts are to be notified in writing.

The coupling parts can be stored in their delivered standard-state for 6 months in a dry, roofed place at normal room temperature. For a longer storage duration a long-term preservation is necessary (consult TSCHAN GmbH). The elastic intermediate ring must not be subjected to ozone containing mediums, direct solar influence or strong light sources with ultraviolet-light. The relative humidity must not exceed 65%. In the case of proper storage the characteristics of the elastic intermediate ring remain unchanged for almost up to three years.

5 Construction

1 Cheese head screw DIN 912
2 Locking washer (Caging washer)
3 Claw ring part 102
4 Flange hub part 104
5 Elastic intermediate ring part 010
6 Claw ring part 108
7 Brake disk part 505, Brake drum part 500
8 Flange hub brake disk connaction part 161
9 Cheese head screw DIN 912

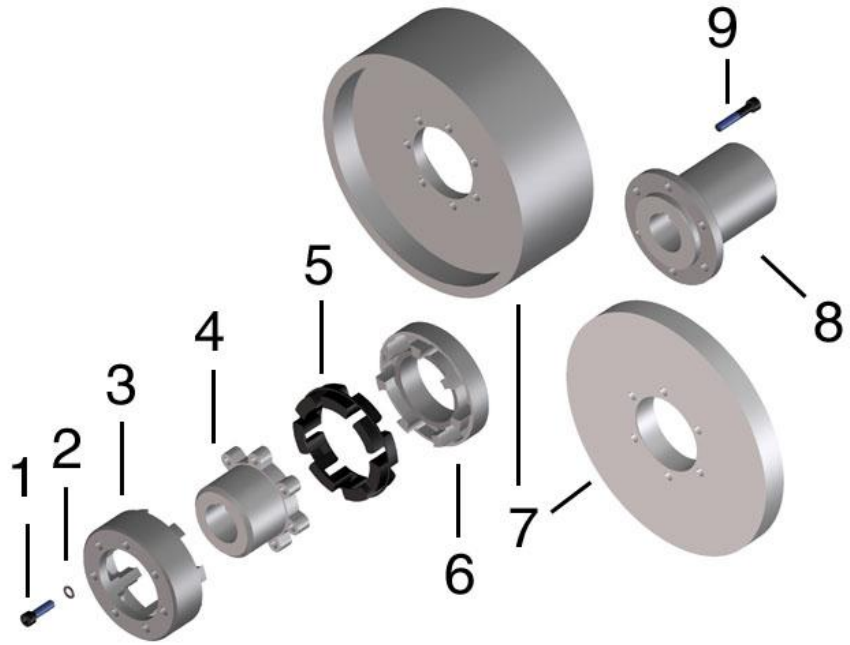


Fig. 1 Construction Nor-Mex® GHBS / GHBT

Reference:
Claw ring (Pos. 3) and flange hub (Pos. 4), claw ring (Pos. 6) with brake disk / drum (Pos.7) and flange hub (Pos. 8), are bolted to each other when supplied.
Balanced parts are position marked to each other.

6 Technical data

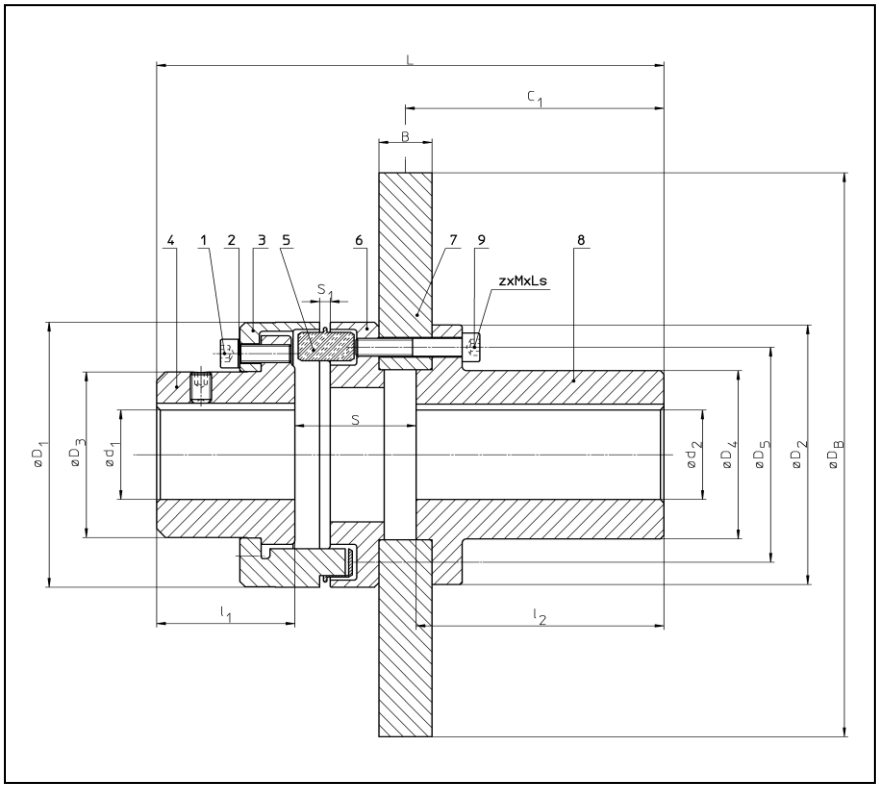


Fig. 2 Nor-Mex® GHBS

Table 1 Technical Data:

Nor-Mex GHBS D_1-D_BxB	T_{Cnom} Pb72 [Nm]	T_{Cpeak} Pb72 [Nm]	T_{BS} [1)] [Nm]	n_{max} [min^{-1}]	d_1 max [mm]	d_2 max [mm]	C_1 [mm]	D_2 [mm]	D_3 [mm]	D_4 [mm]	D_5 [mm]	L [mm]	l_1 [mm]	l_2 [mm]	S [mm]	S_1 [mm]	z x M x Ls	m [kg]
148-315x30	390	800	1000	4500	65	65	146	145	92,5	94	171	286,5	78	140	68,5	6+1	6 x M10 x 55	34
168-355x30	630	1300	1600	4000	75	80	146	168	104,5	115	145	304,5	87	140	77,5	6+1,5	8 x M10 x 60	46
168-400x30																		42,3
168-450x30				3750														60,1
194-400x30	1050	2000	2750	3500	85	95	146	194	121,5	135	170	321,5	97	140	84,5	6+1,5	8 x M12 x 65	61
194-560x30				3000														89,4
240-450x30	2400	4800	4200	2750	100	115	146	225	146,0	165	200	354,0	117	140	97,0	6,5+2	10 x M12 x 70	92
240-560x30																		112,5
240-630x30																		128
265-500x30	3700	7500	8700	2500	115	135	146	265	164,0	195	230	381,5	137	140	104,5	7+2	10 x M16 x 75	121
265-560x30																		132,8
265-710x30				2400														168
295-630x30	4900	10000	9800	2250	130	153	146	265	181,0	215	260	396,5	147	140	109,5	8+2	10 x M16 x 75	169
295-710x30																		171

The torque T_{Cnom} and $T_{Cmax.}$ is valid for:
- Intermediate ring of Perbunan Pb72
- Ambient temperatures of -30 °C to +60 °C,
- Operation within the stipulated alignment values.

Weights are for unbored Hubs

During the layout of the coupling according to DIN 740 part 2 (or also catalogue Nor-Mex®) different factors must be considered:

- with higher temperatures a corresponding temperature factor $S\upsilon$
- according to the starting frequency a starting factor Sz
- in dependence of the operating conditions an impact factor, S_A, S_L
- With circumferential speeds of more than 22 m/s, we recommend to balance the coupling.

For GHBT see as-built drawing.

7 Assembly

7.1 Pay attention before the assembly

- **Danger of injuries!**
- **Disconnect the drive before carrying out any work on the coupling!**
- **Secure the drive against unintentional re-start and rotation!**
- **Incorrectly tightened bolts can cause serious personal injuries and property damages**
- **Assemble the coupling outside of the danger zone. Take care that suitable transportation means are at disposal and that the transportation ways are free of obstacles.**
- **In compliance with accident prevention regulations, you are obliged to protect all freely rotating parts by means of permanently installed guards/ covers against unintentional contact and falling down objects.**
- **To avoid sparks, the covers for couplings used in explosive atmospheres should be made of stainless steel!**
- **As a minimum, the covers have to fulfil the requirements of protection type IP2X.**
- **The covers have to be designed to prevent dust from depositing on the coupling.**
  The cover must not contact the coupling or impair the proper function of the coupling.

- Make sure that the speeds, torques and ambient temperatures as stated in chapter 6 ‘Technical Data’ are not exceeded.
- The maximum permissible bore diameters must not be exceeded.
- Check whether the shaft-hub connections safely transmit the occurring operating torques.
- The standard tolerance of TSCHAN for finish bores is fit H7.
- Standard keyways comply with DIN 6885, sheet 1.
- Check the dimensions and tolerances of shafts, hub bores, keys and keyways.
- Set screws as required.

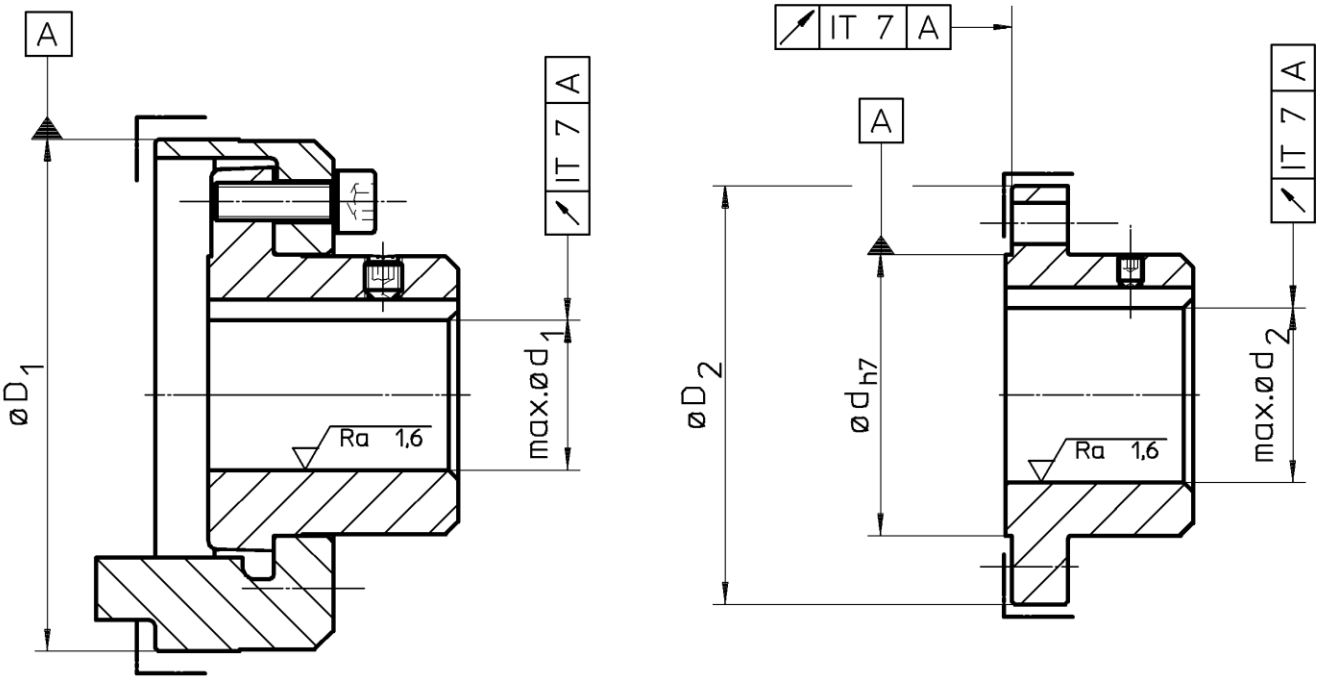
7.2 Finished borehole

For the completion of the finished borehole in a coupling hub, pay attention to following procedure:

- Clean the coupling hub of preservatives.
- Tighten the coupling hub to the faces labelled with ⌈ and carefully align the coupling hub.
- The indicated values in table 1 for ød$_{1max}$ and ød$_{2max}$ are valid for a parallel key connection according to DIN 6885/1 and must not be exceeded.
- Choose the borehole fit so that during the union with the shaft tolerance a wringing fit and/or an interference fit as for example at H7/m6 is carried out.
- Provide a setscrew for axial securing on the hub back above the parallel key slot.

In the case of other shaft hub connections consultation with TSCHAN GmbH is necessary.

- **The maximum indicated borehole diameters are valid for a parallel key connection according to DIN 6885/1 and must not be exceeded.**
- **In the case of transgression of these values the coupling can sever.**
- **Through flying away fragments danger exists!**



7.3 Installing coupling

- Remove the elastic intermediate ring (Fig 3, Pos. 1).
- Clean the borehole of the flange hubs and the shaft ends before installing. The surfaces must be clean, dry and grease-free
- Use suitable installation aids and hoists such as cranes or pulley blocks in the case of bigger couplings.
- Pull the flange hubs on to the shaft end in its intended position (Fig 3, Pos.2).

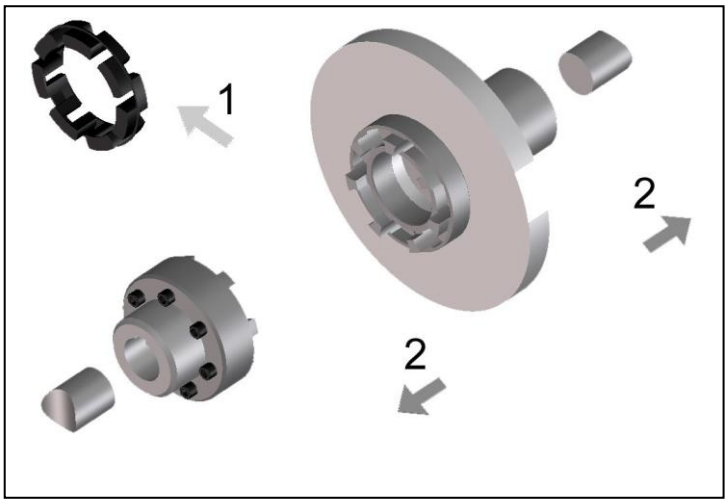


Fig. 3

Reference:
For easier installation a uniform warming of the hub to 80 °C to 120 °C is safe.

- **Warning!**
- **Only work with gloves as a protection against hot parts of the coupling!**

- Mount the hub so that the shaft ends are flush with the interior borehole opening (Fig 4). Protruding shaft ends prevent radial mounting and dismounting of the brake disk. Pay attention to possible differing agreements!
- Secure possible available setscrews by tightening with an adhesive e.g. Loctite 222 against automatic loosening and flying out.

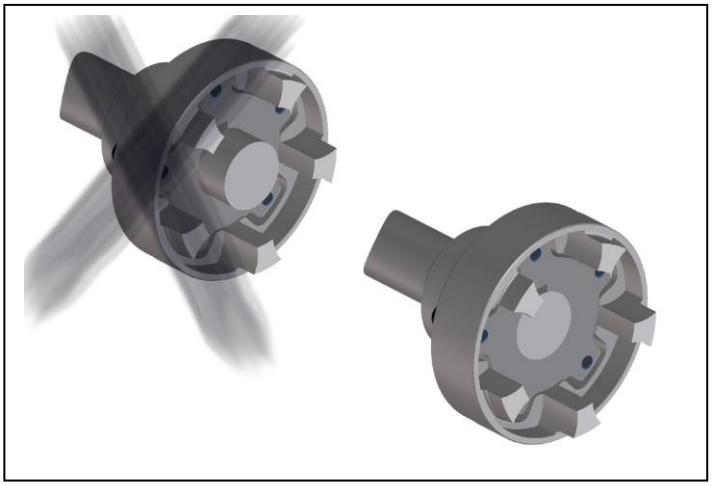


Fig. 4

ATTENTION!
Let the hot hubs cool off to ambient temperature before the introduction of the intermediate ring.

- For easier mounting the elastic intermediate ring can be provided with a slip additive (e.g. Talcum) before introduction.
- Fit the intermediate ring into one half of the coupling.
- Push the shaft ends with the mounted coupling halves together (Fig 5).
- Adjust the coupling according to the following specifications in “8 Coupling adjustment”.

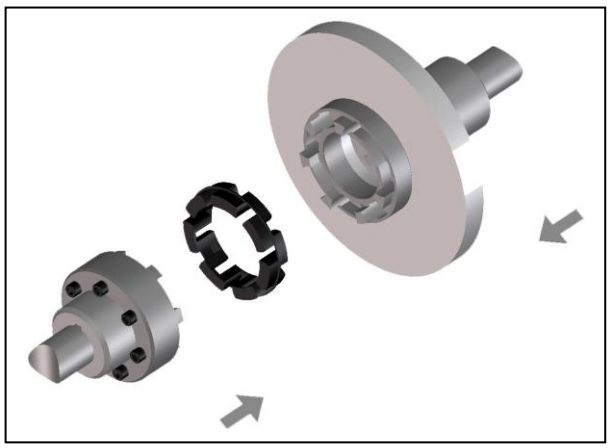


Fig 5

8 Adjusting coupling

- **Injury hazard!**

- **Switch-off the drive before all work on the coupling!**
- **Secure the drive against unintentional switching on and rotating!**

- **Reference:**
- **An exact alignment of the coupling increases the service life of the elastic intermediate ring and lessens hazards by use.**
- **Do not exceed the maximum permissible displacement values. The overstepping of these values results in coupling damage and breakdown!**

- When aligning the cold equipment take into account the expected thermal growth of the components, so that the permissible misalignment values for the coupling are not exceeded in operation.
- Be aware that the coupling under misalignment imposes restoring forces on the adjacent shafts and bearings. Take into account that the larger the misalignment, the greater the restoring forces will be.
- The displacements values indicated in the tables 2 to 4 are maximum permissible guide numbers.
  We recommend not to fully utilise these values during the alignment, so that in operation sufficient reserves remain for thermal expansions, foundation settlements etc.
- In special cases with high demands on quiet running or high rotating speeds it is possible that, in the three displacement levels, an alignment accuracy of ≤0,1 mm is necessary.
- If the coupling is mounted in a closed housing / casing so that a subsequent alignment is not possible any more, it must be guaranteed that the geometry and fit accuracy of the contact surfaces in operation aligns the shafts exactly within the mentioned tolerances.

8.1 Angular misalignment ΔK_w

- Measure on the face of the external diameter a complete rotation (360°). Determine in this case the greatest deviation ΔK_{w1} as well as the smallest deviation ΔK_{w2} (Fig. 6).
- Calculate the angular misalignment $\Delta K_w = \Delta K_{w1} - \Delta K_{w2}$.
- The values in table 2 are valid for a reference rotation speed of 1500 min^{-1}.

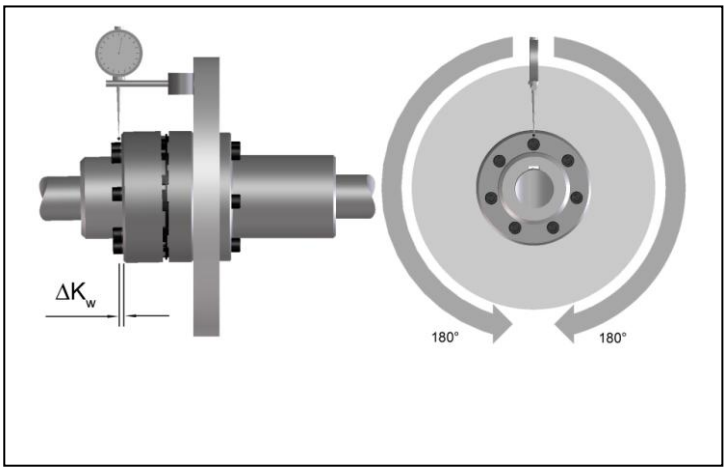


Fig. 6

Table 2 Maximum permissible displacement values - angular:

Size	148	168	194	240	265	295
ΔK_{Wmax} [mm]	0,3	0,3	0,3	0,3	0,3	0,3

8.2 Radial displacement ΔK_r

- Measure a complete rotation (360°). Determine in this case the greatest deviation ΔKr1 as well as the smallest deviation ΔK_{r2} (Figure 7).
- Calculate the radial displacement $\Delta K_r = 0,5 \times (\Delta K_{r1} - \Delta K_{r2})$. Pay attention to the operational sign of the measured values.
- The values of table 3 are valid for a reference rotation speed of 1500 min^{-1}.

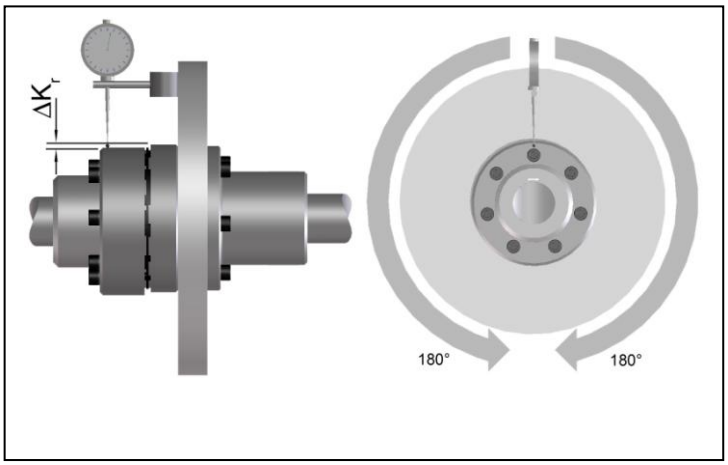


Fig. 7

Table 3 Maximum permissible displacement values - radial:

Size	148	168	194	240	265	295
$\Delta K_{r\,max}$ [mm]	0,3	0,3	0,3	0,3	0,3	0,3

8.3 Axial displacement

- Measure the axial S_1 gap measurement according to figure 8.
- Keep, when aligning the gap measurement S, to the maximum permissible tolerance X according to table 4.

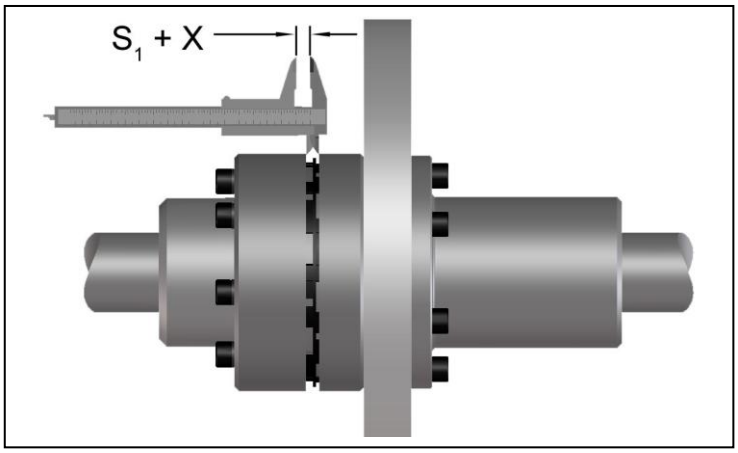


Fig. 8

ATTENTION!
If the installation dimension remains over S_1, the claw ring and brake disk can not be lifted out!
If greater axial displacements are expected in operation, consultation with TSCHAN GmbH is necessary.

Table 4 Recommended alignment values - axial:

Size	148	168	194	240	265	295
S_1 [mm]	6	6	6	6,5	7	8
X [mm]	+1,0	+1,5	+1,5	+2,0	+2,0	+2,0

9 Operation

When using the coupling attention is to be paid to its characteristics (see „6 Technical data”). These can in no case be exceeded without having a written agreement from TSCHAN GmbH.
In order to guarantee a faultless, lasting operation of the coupling, it must be laid out according to the regulations e.g. DIN 740 part 2 (or according to catalogue Nor-Mex®) with an operating factor corresponding to its operating conditions.
Every change of the conditions of use or the operating parameters makes an inspection of the coupling layout urgently necessary.

- **Injury danger!**
- **Switch-off the drive before all work on the coupling!**
- **Secure the drive against unintentional switch-on and rotating!**
- **Due to incorrectly tightened screws parts can fly away and cause serious injuries to persons and damage to material!**
- **Check before commissioning the coupling the alignment and all screw fastenings for their specified tightening torque and/or firm seating!**
- **Before commissioning the plant install all protective devices against unintentional touching of free moving and/or rotating parts.**
- **To avoid sparks coverings in stainless steel should be used!**
- **The coverings must fulfil at least the protection type IP2X.**
- **The covering is to be so designed that it does not deposit dust onto the coupling parts.**
- **The covering must not touch the coupling or influence it in its functioning.**

Pay attention during the operation of the coupling to:
- Changed running noises
- Occurring vibrations

Attention!
- **If irregularities are found during operation of the coupling, the drive must be immediately switched off.**
- Detect according to the following table 5, “Operating faults and their possible causes” the faults and remove.
  The listed faults are some examples which are supposed to facilitate fault location.
- **For fault finding and elimination all machine components and operating states are to be considered!**

Table 5 Operating faults and their possible causes:

Trouble	Cause	Risk Warning	Correction
Irregular running noises/ vibrations	Alignment fault	Considerable increase in coupling temperature. Premature wear of elastic buffers. Increased reaction forces act on connected machines.	- Disconnect drive - Remove cause for alignment fault - Re-align coupling - Inspect elastomer for wear
	Elastomer worn out	Coupling claws strike against each other. Spark formation, claw fracture, increased reaction forces.	- Disconnect drive - Check coupling components for damages and replace parts, if necessary - Replace elastomer
	Unbalance	Considerable increase in coupling temperature. Premature wear of elastic buffers. Increased reaction forces act on connected machines	- Disconnect drive - Verify balance state of plant components and correct it, if necessary - Inspect elastomer for wear
	Loose screw connections	Flying off parts can cause serious injuries and considerable damages.	- Disconnect drive - Check coupling parts for damages, replace parts, if necessary - Verify alignment of coupling - Tighten screws to the specified tightening torque and secure them against working loose, if necessary, - Inspect elastomer for wear
Premature wear of elastomer	Alignment fault	Considerable increase in coupling temperature. Increased reaction forces act on connected machines.	- Disconnect drive - Remove cause for alignment fault - Re-align coupling - Inspect elastomer for wear

Trouble	Cause	Risk Warning	Correction
	Unacceptable temperatures	Material properties of elastic buffers change. The torque transmission capability is adversely affected.	- Disconnect drive - Replace elastomer - Re-align coupling - Adjust ambient temperature
	Contact with aggressive products	Material properties of elastic buffers change. The torque transmission capability is adversely affected.	- Disconnect drive - Check coupling parts for damages and replace parts, if necessary - Replace elastomer - Verify alignment of coupling - Prevent contact with aggressive products
	Torsional vibrations in the drive line	Considerable increase in coupling temperature. Premature wear of elastic buffers. Increased reaction forces act on connected machines.	- Disconnect drive - Analyse and eliminate cause for torsional vibrations - Check coupling parts for damages and replace parts, if necessary - Replace elastomer and consult TSCHAN GmbH concerning eventual use of another Shore-hardness - Verify coupling alignment
Claw breakage	Wear limit of elastomer exceeded ===> contact of claws	Coupling is destroyed. Connected machines can be affected, too.	- Disconnect drive - Replace coupling - Inspect the elastomer for wear at shorter intervals
	Overload due to too high torque	Coupling is destroyed. Connected machines can be affected, too.	- Disconnect drive - Verify coupling design in cooperation with TSCHAN GmbH - Replace coupling - Install larger coupling, if necessary

9.1 Sense of rotation test

- **Injury danger!**
- **Switch-off the drive before all work on the coupling!**
- **Secure the drive against unintentional switching on and rotating!**
- **Due to incorrectly screwed on screws, parts can fly away and cause person and material damage!**
- **Check before commissioning the coupling the alignment and all screw fixings for their specified tightening torque and/or firm seating!**
- **Before commissioning the plant all protective devices against unintentional touching of free moving and/or rotating parts must be installed.**
- **To avoid sparks coverings should be made of stainless steel!**
- **The coverings must fulfil at least the protection type IP2X.**
- **The covering is to be designed in such a way that it does not deposit dust onto the coupling parts.**
- **The covering must not touch the coupling and/or influence it in its function.**

- Remove the fixing screws on the claw ring and push it back (Fig. 9, Pos. 1).
- Secure the claw ring against unintentional displacement.
- Cut through the intermediate ring at a connecting part (Fig. 9, pos. 2).
- Pull out the intermediate ring. Start at the cut through connecting part.

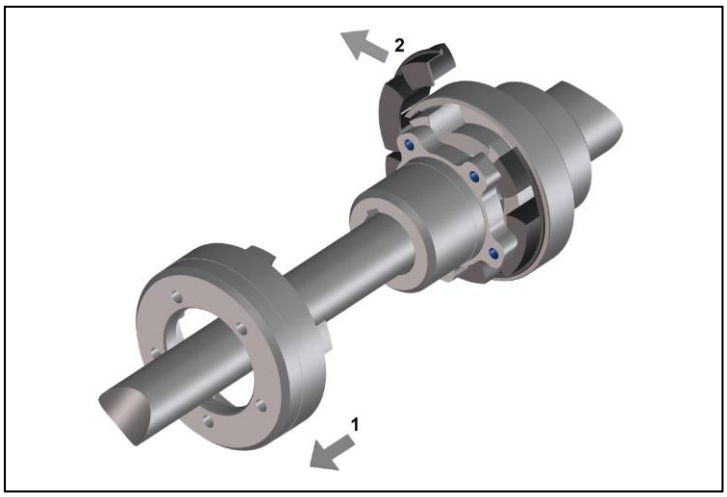


Fig. 9

- **Attention!**
- **Make sure, that the coupling halves can not move axially during the sense of rotation test.**
- **The coupling half with the pulled back claw ring must remain stationary during the sense of rotation test.**
- **The rotating half must not touch the stationary half!**

- Carry out the rotation test.
- After the sense of rotation test, cut through a new intermediate ring at a connecting part and fit it between coupling hub and flange.
- To obtain an easier mounting one can provide the new elastic intermediate ring with a slip additive before its introduction (e.g. talcum powder)

Attention!
The bearing surface of the claw ring and flange hub must be clean, dry and grease-free. Balanced parts are position marked to each other.

- Mount the claw ring into its marked position. When doing this pay attention also that the parts not tilt when being joined to the centering seat.
- Slightly tighten the screws uniformly.
- Tighten the claw ring threaded joint with the tightening torque M_A stipulated in table 6 (Fig. 10).
- Check the alignment of the coupling according to the specifications in „8 Coupling adjustment”

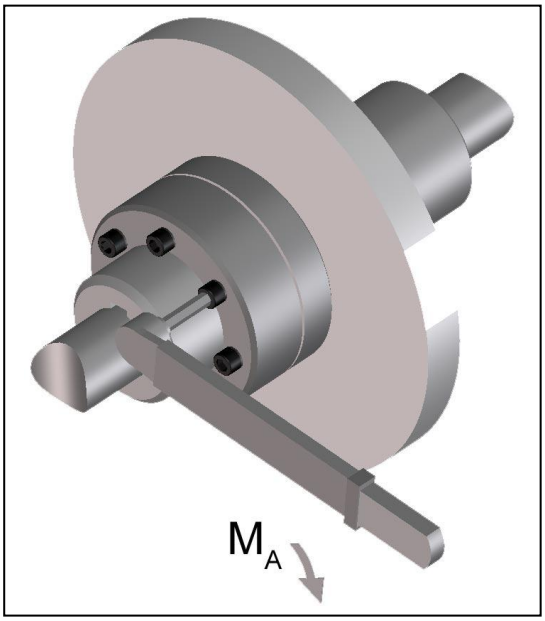


Fig. 10

Table 6 Tightening torques M_A of the claw ring threaded joint:

Size	148	168	194	240	265	295
DIN 912- 8.8	M10	M10	M10			
DIN 912-10.9				M12	M14	M14
M_A [Nm]	49	49	49	125	200	200

10 Maintenance

The elastic coupling Nor-Mex ®-GHBS / GHBT has in operation a low-maintenance. Reaching the wear limit of the elastic intermediate ring depends on the operating parameters and the conditions of use.
In the case of routine monitoring work on the plant check:

- Alignment of the coupling
- Elastomer state
- Remove dust deposits from the coupling parts and the intermediate ring

10.1 Wear Inspection on the Buffer Ring

- **Danger of injuries!**
- **Disconnect the drive before carrying out any work on the coupling!**
- **Secure the drive against unintentional switching on and rotating!**

Perform a visual inspection and a wear inspection of the buffer ring after 2000 hours, or after 3 months at latest, after the first start-up of the equipment. If only minor wear or no wear is observed, further inspections of the plant can be carried out at regular intervals of 4000 hours, however, at least once a year, if the operating modes and conditions of the plant remain unchanged. However, should you observe excessive wear on the occasion of this first inspection already, check whether the cause for the problem is listed in table 5 “Operation faults and possible causes”. In such a case, the inspection intervals must be adapted to the prevailing service conditions.

On the occasion of routine inspections or maintenance work on the drive equipment, or after 3 years at latest

- Replace the elastic buffer ring.
- If the wear limit has been reached or exceeded, replace the buffer ring immediately, irrespective of the inspection intervals of the equipment.
- Check the alignment of the coupling.
- Remove dust deposits from the coupling components and buffer ring.

10.2 Wear limit of elastic buffers

Replace the elastic buffer ring as soon as the coupling has a distinct torsional backlash, or if the minimum buffer thickness (PD_{min}, Fig. 11) acc. to table 7 has been reached.

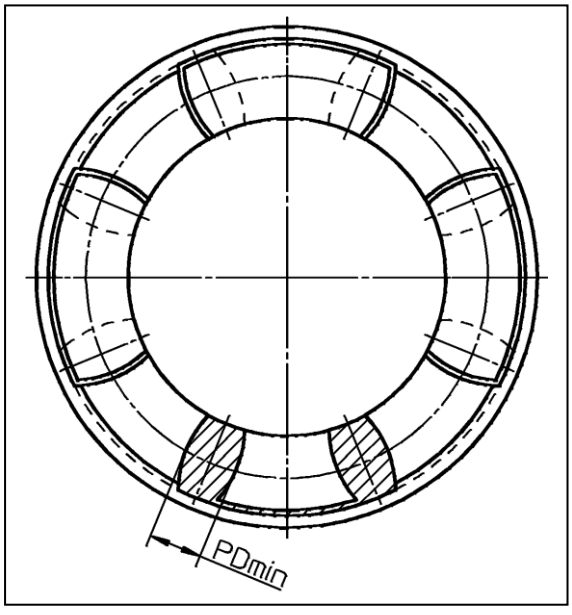


Fig. 11 Buffer thickness

Table 7 Minimum buffer thickness PD_{min}:

Size	148	168	194	214	240	265	295
PD_{min} [mm]	10	10	10	10	11	12	13

10.3 Changing the elastic intermediate ring and brake disk / drum

- **Injury hazard!**
- **Switch-off the drive before all work on the coupling!**
- **Secure the drive against unintentional switching on and rotating!**

- Remove the holding-down screws on the claw ring and push it back (Fig. 12, Pos. 1)
- Cut through the intermediate ring at a connecting joint (Fig. 12, Pos. 4).
- Pull out the intermediate ring. Begin at the cut through connecting joint.
- For replacing the brake disk, remove the cheese head screws (Fig. 12, Pos. 5) on the brake disk side. It is now possible to radially take out the claw ring (Fig. 12, Pos. 5) and to replace the brake disk (Fig. 12, Pos. 6). If the brake drum needs to be replaced, one of the coupling halves has to be moved axially.
- Install the claw ring again and tighten the brake disk-side cheese head screws to the torque $M_{A\text{-}BS}$ specified in Table 9.
- Cut through the new intermediate ring at a connecting joint and position it between coupling flange and flange hub.
- For easier mounting, the new intermediate ring can be provided with a slip additive before introduction (e.g. Talcum).

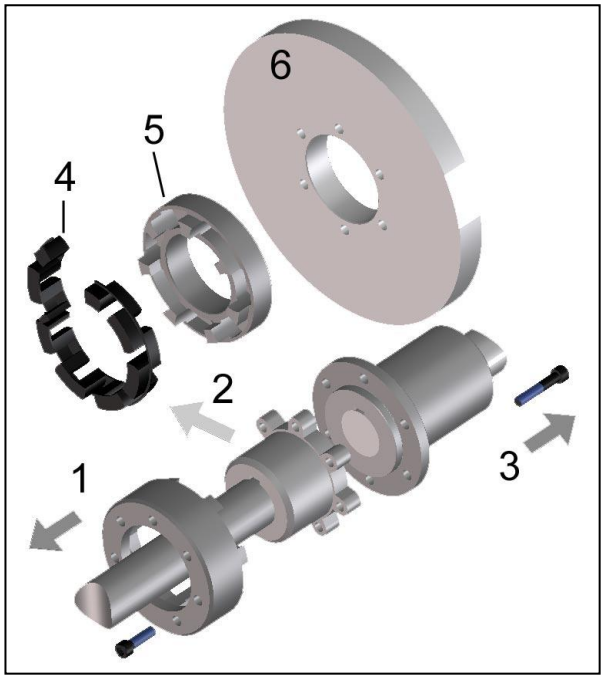


Fig. 12

Attention!
The bearing surfaces of the claw rings, flange hubs and brake disk must be clean as well as oil and grease-free. Balanced parts are position marked to each other! When doing this pay attention also that the parts not tilt when being joined to the centering seat.

- Mount the claw ring into its marked position.
- Tighten the screws slightly.
- Tighten up the claw ring threaded joints with the tightening torque M_A stipulated in table 8 (Fig. 13).
- Check the alignment of the coupling according to “8 Coupling adjustment“.

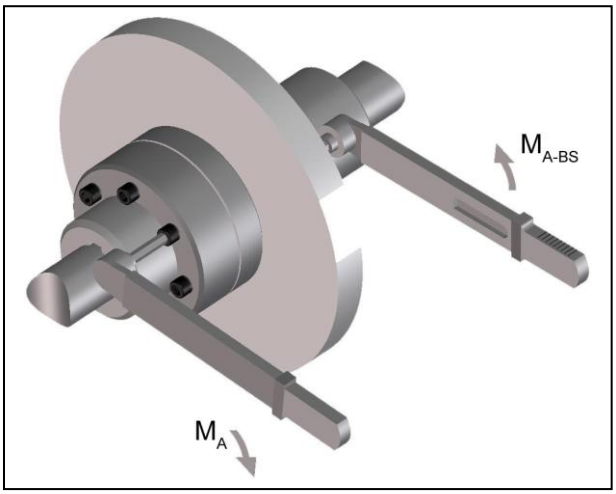


Fig. 13

Table 8 Tightening torques M_A for the claw ring threaded joints:

Size	148	168	194	240	265	295
DIN 912- 8.8	M10	M10	M10			
DIN 912-10.9				M12	M14	M14
M_A [Nm]	49	49	49	125	200	200

Table 9 Tightening torques M_{A-BS} for brake disk threaded joints:

Size	148	168	194	240	265	295
DIN 912- 8.8	M10	M10	M12	M12	M16	M16
M_{A-BS} [Nm]	49	49	85	85	210	210

Warning!

- **Before commissioning the plant install all protective devices against unintentional touching of free rotating parts.**
- **To avoid sparks coverings in stainless steel should be used.**
- **The coverings must fulfil at least the protection type IP2X.**
- **The covering is to be so designed that it does not deposit dust onto the coupling parts.**
- **The covering must not touch the coupling or influence it in its functioning.**

When using accessories and spare parts which were not originally manufactured by TSCHAN GmbH, no liability or guarantee for any damages will be accepted.

11 Waste Disposal

The waste disposal has to occur according to the specific regulations of the respective user country.