KUPPLUNGSWERK DRESDEN

Operation manual
KWN 31045
Edition h

Operation manual

Torsional stiff all metal couplings

according to
KWN 21016

TÜV CERT EN ISO 9001

Author:	Dipl.-Ing. . V. Hausdorf	02.02.2005	gez. V. Hausdorf
Approved:	Dr.-Ing. Ch. Spensberger	02.02.2005	gez. Dr.-Ing. Ch. Spensberger
	Name	Date	Signature

KWD Kupplungswerk Dresden GmbH
Löbtauer Straße 45 - D – 01159 Dresden
Postfach 270144 – D – 01172 Dresden
Tel.: + 49(0)351 – 4999-0 Fax: + 49(0)351 – 4999-233
kwd@kupplungswerk-dresden.de
http://www.kupplungswerk-dresden.de

Table of Contens

MANUFACTURER'S DECLARATION 3

1. GENERAL AND SAFETY.....5

2. TRANSPORT AND STORAGE 5

3. TECHNICAL DESCRIPTION/COMPONENTS 6

4. ASSEMBLING 7

4.1. ASSEMBLING THE COUPLING PARTS 8

4.2. ALIGNMENT.....10

5. ASSEMBLING THE ELEMENTS.....14

6. MAINTENANCE AND SPARE PARTS.....15

7. SPARE PARTS.....16

Manufacturer's Declaration

Product: Torsional stiff all metal couplings
GMK according to KWN 21016

In accordance with the EU Machine Directive 98/37/EG, Appendix IIB

we

KWD
Kupplungswerk Dresden GmbH
Löbtauer Straße 45 - D – 01159 Dresden
P.O. Box 270144 – D – 01172 Dresden

hereby declare, that the

Torsional stiff all metal couplings GMK
according to KWN 21016

described in this operation manual are intended for installation in a machine. Commissioning of the machine is prohibited until it is established whether the machine, in which these components are fitted complies with the EU directive (original issue 89/392/EWG, including all subsequent amendments).
All harmonized standards published by the EU Commission in the Official Gazette of the European Union – insofar as they apply to this product – have been taken into consideration.

Date/ Manufacturer's signature 09.02.2005 signed C. Spensberger

Safety and Information Symbols

Danger! **Danger of injury to personnel**

Attention! **Follow instructions**

1. General and Safety

This Operation Manual (OM) is a constituent part of the scope of delivery of the coupling. Only the observance of all instructions and information will guarantee trouble-free operation of the coupling within the specified parameters. The coupling must be used only under conditions specified in the specification sheets (specification leaflet). Any deviation from this requires prior consultation of the manufacturer as well as his approval.

The following general safety instructions must be observed at all times when working on the coupling:

- The coupling may only be serviced, repaired or operated by authorized and properly trained personnel.
- As a matter of principle, any work on the coupling may only be performed at a complete standstill. The motive power aggregate must be secured against accidental operation (for example, by interrupting energy supply).
- The motive power aggregate must be shut down immediately if changes are observed on the coupling during operation.
- The coupling must be secured against accidental contact and escape of oil by means of appropriate protective equipment.

2. Transport and storage

During transport the couplings must be secured against impact, shock and contact damage. For transport or lifting of the coupling and for installation, non-metallic load suspension devices with a sufficient safety margin must be used exclusively.

The couplings must be stored indoors in enclosed and dust-free storerooms, with the exclusion of harmful influences, such as condensates, excessive humidity (< 70%) and ozone.

It is not permissible to lift the drive unit by lifting the all-metal coupling mounted on it.

The surfaces of unpainted coupling halves are provided with a temporary corrosion prevention that is effective for 6 months. Other measures must be taken if they are to be stored for a longer period.

3. Technical Description/Components

All-metal couplings from the GMK series are torsion-resistant and flexible couplings. The torque range and the wide variety of types guarantee a broad spectrum of applications for many industrial and other uses.
If used and assembled correctly, all-metal couplings are maintenance-free and designed for long-time fatigue resistance. They can be used for temperatures up to 250°C.
All-metal couplings compensate for axial and angular shaft displacement in the single element design (SE) and for radial shaft displacements also in the double element design (DE).
All-metal couplings lead to low restoring reactions when aligned properly.
All-metal couplings can be combined with a lot of other coupling types.

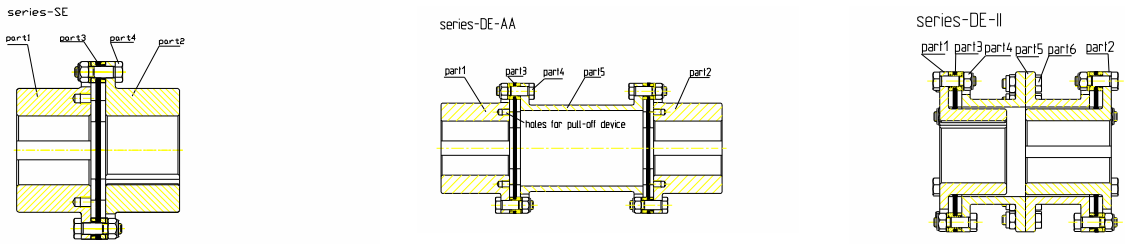


Fig. 1

The all-metal couplings consist of the hubs (sections 1+2), the elements (section 3), the screw connection (section 4) for the elements and, apart from the SE series, the adapter sleeves (section 5). The adapter sleeves can be provided in divided and undivided versions. There is a set of dowel screws (section 6) for the divided adapter sleeves.

The couplings are supplied in individual parts. The flexible elements and the screw connection are each enclosed, individually packed. Where couplings are supplied as a complete unit, please refer to the assembly drawing to see which screws have only been inserted loosely for pre-assembly. These screws must be inserted fully with the torque indicated on the assembly drawing.

4. Assembling

The safety instructions given in chapter 1 must be observed during assembly.

The assembly must be carried out with the greatest of care by qualified staff who have been given the relevant instructions. A sufficient amount of suitable hoists must be available when commencing assembly.

Feather-key connections are the standard way to connect shaft and hub.
Before assembling the hubs, check that the existing mounting space is sufficient to mount the dowel screws after shrinking-on the hubs and tighten by means of a torque wrench. For this purpose, look up the Ü 1 size in the Main Dimensions table in KWN 21016 and take account also of the space required for the torque wrench.

This applies to the types:

- GMK _ _ _ -4 SE- AA
- GMK _ _ _ -4 DE- AA
- GMK _ _ _ -6 DE- II
- GMK _ _ _ -6 DE -IIG

If the mounting space is not sufficient, take the following steps for the following types:

- GMK _ _ _ - 4 SE -AA / GMK _ _ _ -4 DE -AA : insert the screws beforehand

- GMK _ _ _ - 6 DE –IIG: insert the screws beforehand, the hubs, the flexible elements and the Intermediate piece divided for each side must be pre-assembled,

- GMK _ _ _ - 6 DE -II the screws must be inserted beforehand, the hubs, the flexible elements and the intermediate piece (on one side) must be pre-assembled

4.1. Assembling the coupling parts

To assemble the hub, proceed as follows:

- check adherence to the specified combinations of fits - see KWN 21016
- clean the hub bores and shafts

Follow the manufacturer's instructions on handling the solvent !

- the hubs must be pushed on using suitable aids and/or devices
- it is not permissible to hit it when pushing it on.
- the hubs are heated to approx. 200°C to make it easier to push them on

Guard against burns from hot section

Depending on the type, the elements are connected with the hubs, the adapter sleeve and the distance plate. The elements are screwed together by means of dowel screws, which are tightened to a degree that ensures a non-positive transmission of torque. For this reason, the dowel screws must be tightened with the values given in table 1 for the tightening torques M A. They are tightened with a torque wrench. The dowel screws must always be arranged so that the screw head lies on the collar of the hub or the intermediate piece and the nut/washer on the element. The tightening torques apply to unlubricated screws (friction coefficient μ=0.15). If the screws are greased, the tightening torques must be adjusted to the friction coefficients.
In the case of couplings, which are balanced as a complete unit, the sections must be assembled in accordance with the marking.

Table 1

Size	Torque M_A in Nm	SW	Size	Torque M_A in Nm	SW	Size	Torque M_A in Nm	SW	Size	Torque M_A in Nm	SW
4-4	5.5	8	100-	33	13	1000-	550	30	4000-6	3770	55
6.3-	13	10	140-	33	13	1250-	550	30	6300-6	5917	65
16-4	13	10	200-	65	17	1400-	960	36	8000-6	5917	65
25-4	33	13	250-	115	19	1600-	1556	41	10000-	8756	75
40-4	33	13	400-	280	24	2000-	1556	41			
63-4	65	17	630-	280	24	2500-	2050	46			

The flanges in the GMK _ _ _ - 6 DE IIG types are also screwed together by means of dowel screws. The dowel screws are tightened using a torque wrench with the tightening torque M_{A1} given in table 2. The tightening torques apply to unlubricated screws (friction coefficient μ=0.15). If the screws are greased, the tightening torques must be adjusted to suit the friction coefficient.

Table 2

Size	Torque M_{A1} in Nm	SW	Size	Torque M_{A1} in Nm	SW	Size	Torque M_{A1} in Nm	SW
100-6	33	13	1000-6	550	30	4000-6	3770	55
140-6	33	13	1250-6	550	30	6300-6	5917	65
200-6	65	17	1400-6	960	36	8000-6	5917	65
250-6	115	19	1600-6	1556	41	10000-6	8756	75
400-6	280	24	2000-6	1556	41			
630-6	280	24	2500-6	2050	46			

4.2. Alignment

The driving and driven parts must be aligned axially, radially and angularly. The alignment must be done in such a way that the remaining shaft displacement and additional shaft displacement during operation are equal to or less than the permissible values given in the following tables. The shaft displacement should be as kept as low as possible because it influences the service life of the elements and the degree of restoring reactions. The permissible values are given in the following tables:

GMK _ _ _- 4 DE -AA, GMK _ _ _ - 4 SE -AA and GMK _ _ _ - 4 DE-K Types

Table 3

	GMK _ _ _ - 4 SE		GMK _ _ _ - 4 DE –AA			GMK _ _ _ - 4 DE-K			
Size	ΔK_w 1) (angular)	ΔK_a 1) (axial)	ΔK_w 1) (angular)	ΔK_a 1) (axial)	ΔK_r 1) (radial)	Size	ΔK_w 1) (angular)	ΔK_a 1) (axial)	ΔK_r 2) (radial)
4-4	0.5	0.6	0.5	0.6	0.25	2.5-	0.5	0.6	0.09
6.3-	0.5	0.8	0.5	0.8	0.28	4-4	0.5	0.8	0.1
16-4	0.5	1	0.5	1	0.28	6.3-	0.5	1	0.1
25-4	0.5	1.2	0.5	1.2	0.33	10-4	0.5	1.2	0.16
40-4	0.5	1.4	0.5	1.4	0.33	14-4	0.5	1.4	0.16
63-4	0.5	1.6	0.5	1.6	0.43	25-4	0.5	1.6	0.18

1) apply individually to each element and must be reduced accordingly if more than one form of displacement arises
2) in the case of complete utilisation of the angular displacement capacity

GMK _ _ _- 6 DE -AA, GMK _ _ _ - 6 SE -AA and GMK _ _ _ - 6 DE-II / IIG types

Table 4

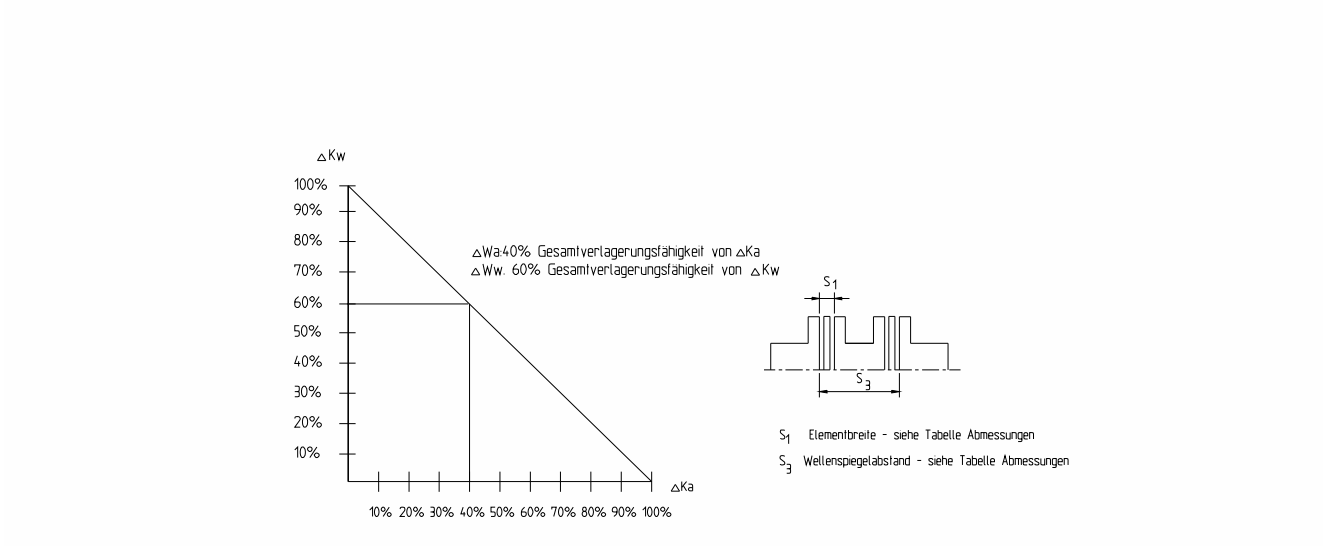
	GMK _ _ _ - 6 SE		GMK _ _ _ - 6 DE - AA			GMK _ _ _ - 6 DE-II			GMK _ _ _ - 6 DE-IIG		
Size	ΔK_w 1)	ΔK_a 1)	ΔK_w 1)	ΔK_a 1)	ΔK r 1)	ΔK_w 1)	ΔK_a 1)	ΔK_r 2)	ΔK_w 1)	ΔK_a 1)	ΔK_r 2)
100-6	0.5	1	0.5	1	1.2	0.5	1	1.2	0.5	1	1.2
140-6	0.5	1.1	0.5	1.1	1.2	0.5	1.1	1.2	0.5	1.1	1.2
200-6	0.5	1.3	0.5	1.3	1.2	0.5	1.3	1.2	0.5	1.3	1.2
250-6	0.5	1.3	0.5	1.3	1.7	0.5	1.3	1.7	0.5	1.3	1.7
400-6	0.5	1	0.5	1	1.7	0.5	1	1.7	0.5	1	1.7
630-6	0.5	1.2	0.5	1.2	2.2	0.5	1.2	2.2	0.5	1.2	2.2
1000-6	0.5	1.4	0.5	1.4	2.6	0.5	1.4	2.6	0.5	1.4	2.6
1250-6	0.7	2.1	0.7	2.1	3.7	0.7	2.1	3.7	0.7	2.1	3.7
1400-6	0.7	2.2	0.7	2.2	3.6	0.7	2.2	3.6	0.7	2.2	3.6
1600-6	0.7	2.4	0.7	2.4	4.5	0.7	2.4	4.5	0.7	2.4	4.5
2000-6	0.7	2.5	0.7	2.5	4.4	0.7	2.5	4.4	0.7	2.5	4.4
2500-6	0.7	2.8	0.7	2.8	4.4	0.7	2.8	4.4	0.7	2.8	4.4
4000-6	0.7	3	0.7	3	5.3	0.7	3	5.3	0.7	3	5.3
5000-6	0.7	3.4	0.7	3.4	5.2	0.7	3.4	5.2	0.7	3.4	5.2
6300-6	0.7	3.6	0.7	3.6	5.1	0.7	3.6	5.1	0.7	3.6	5.1
8000-6	0.7	3.9	0.7	3.9	6.2	0.7	3.9	6.2	0.7	3.9	6.2
10000-6	0.7	4.1	0.7	4.1	6.1	0.7	4.1	6.1	0.7	4.1	6.1

For footnotes see table 1

In each case, the characteristic values for axial displacement (Δk_a), angular displacement (ΔK_w) and radial displacement (ΔK_r) given in the tables are the maximum possible values if only one of these forms of displacement occurs.

If axial and angular displacement occur together, these must be determined in accordance with their shares in the overall displacement capacity.

The determination of the axial and angular and radial displacement capacity when they occur together.



?Wa: 40% total displacement capacity of ?Ka
?WW: 60% total displacement capacity of ?KW

S1 Element width – see table on dimensions
S3 Shaft end face spacing – see table on dimensions

Fig. 2

If axial shaft displacement ΔW_a amounting to 40% of the axial displacement capacity ΔK_a occurs, the additional angular displacement ΔW_w may amount to 60% of the angular displacement capacity ΔK_w. The values given in the tables for radial displacement capacity ΔK_r refer to 100% utilisation of the angular displacement capacity ΔK_w. If angular displacement ΔW_w and radial displacement ΔW_r occur together, the total angular displacement capacity ΔK_w must be distributed. The radial displacement ΔK_r* which then applies is calculated as follows:

$\Delta K_r^* = \tan \Delta K_w^* \times (S_3 - S_1)$ für Bauform GMK _ _ _ - 6 DE-AA
$\Delta K_r^* = \tan \Delta K_w^* \times (S_3 - S_4)$ für Bauform GMK _ _ _ - 4 DE-K
$\Delta K_r^* = \tan \Delta K_w^* \times (l_{1/11} - (S_4 + (2 * b_2))$ für Bauform GMK _ _ _ - 6 DE-II /IIG
$\Delta K_w^* = \Delta K_w - \Delta W_w$
ΔK_r^* .... resultierende radiale Verlagerungsfähigkeit der Kupplung

Axial Alignment

The driving and driven parts must be aligned axially in relation to each other so that the size of the measurement is

$s_{1\,ACT}$ *(*$s_{1\,IST}$ *in German)* = $s_1 \pm \Delta K_a$.

s_{1ACT} .... Actual size of the spacing s_1

for GMK_ _ _ - 4 DE K types and for GMK_ _ _ - 6 DE II/IIG types the size s_1 conforms to size s_4

Alignment is done by using a Vernier calliper or measuring stones to check the measurement s_1 at at least 3 points, each offset 120° in relation to each other. By pushing the driving and driven parts, the dimension s_1 must be brought to the required measurement. Allowance must be made for thermal expansions.

Angular Alignment

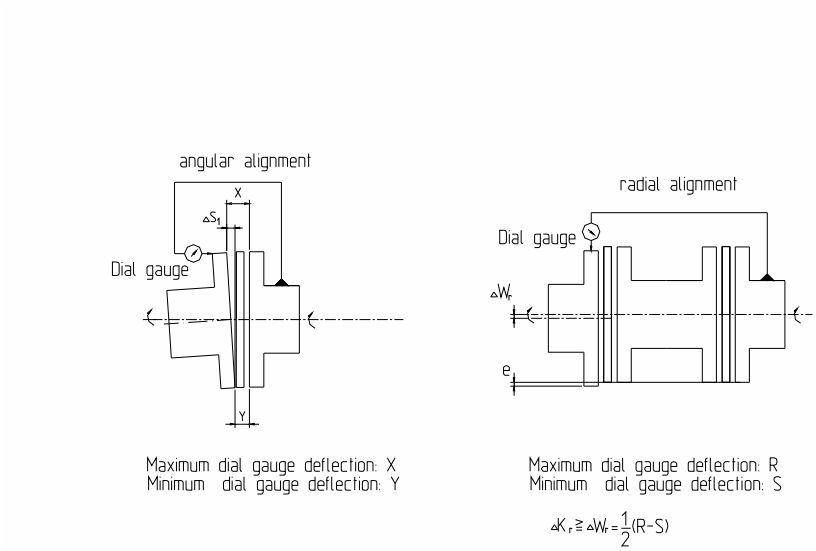


Fig. 3

The existing angular shaft displacement is checked by measuring the difference in dimension (size of gap) of the size s_1 (for the GMK_ _ _ - 4 DE-K types and for GMK_ _ _ -6 DE II/IIG the size s_1 conforms to the dimension s_4) , formed from the largest and smallest spacing s_1 in a full revolution of the coupling.

The difference between the measured dimensions X and Y should be less than or equal to ΔS_{1zul} *(zul = permissible)*. The maximum and minimum values of the gap dimension must lie within $s_1 \pm \Delta K_a$.

$\Delta S_{1zul} = \sin\Delta K_W * d_6 \geq (X - Y)$

ΔK_w... Angular displacement capacity in accordance with the KWN 21016 Specifications tables

d_6 ..... Outer diameter of the coupling in conformance to the KWN 21016 Main dimensions tables

X, Y ... Dimensions as measured

If the radial displacement ΔW_r occurs at the same time, ΔK_wmust be reduced accordingly. Depending on the level of accuracy required, the dimensions X and Y are measured either by means of Vernier callipers or if a higher level of accuracy is needed, by means of dial gauges (see fig. 3).

Radial Alignment

The existing radial shaft displacement ΔW_r can be determined by measuring the dimension e or if a higher level of accuracy is required, it is determined from half the difference between the dimensions R and S (see the above illustration). Here ΔW_r must be less than or equal to the values for ΔK_r from the Specifications tables. If angular shaft displacement ΔW_w occurs at the same time, ΔK_r must be reduced as described above.

5. Assembling the elements

Depending on the type, the elements are connected with the hubs, the adapter sleeve and the distance plate**.** The elements are screwed together by means of dowel screws, which are tightened to a degree that ensures a non-positive transmission of torque. For this reason, the dowel screws must be tightened with the values given in table 3 for the tightening torques M_A. They are tightened with a torque wrench. The dowel screws must always be arranged so that the screw head lies on the collar of the hub or the intermediate piece and the nut/washer on the element. The tightening torques apply to unlubricated screws (friction coefficient μ=0.15). If the screws are greased, the tightening torques must be adjusted to the friction coefficients.

In the case of couplings, which are balanced as a complete unit, the sections must be assembled in accordance with the marking.
Before commissioning, check that all screws connections are tight and that the hubs are aligned properly. Correct if necessary. Finally, put safeguards on the coupling to prevent unintentional contact.
The coupling must run quietly in all phases of operation without vibrations. Any deviation must be regarded as a fault to be eliminated immediately.

While the coupling is operating, pay attention to:

- changes in running noises
- vibrations and oscillations occurring suddenly

If irregularities are noticed during operation, the drive assembly must be turned off immediately.

The cause must be found and eliminated. If the coupling is integrated in a complex plant, check all other components too when searching for the fault.

6. Maintenance and Spare Parts

Before doing any maintenance, repairs or other work, the operator must ensure that the coupling train has stopped completely, the plant must be safeguarded against being switched on again unintentionally. The accident prevention and safety rules must be adhered to.

The all-metal coupling is maintenance-free. Maintenance is limited to visual inspections of the flexible elements for damage, checking that the screwed connections are tight and that the permissible displacement is not exceeded. If may be necessary to replace the flexible elements including the screwed connections. The coupling drawing shows which screw connections are used with which elements.

7. Spare parts

When installing and/or using spare parts that we did not supply, remember that these spare parts have not been approved or checked by us and using them might damage the coupling or impair safety. If damage arises out of the use of non-original spare parts or accessories, KWD Kupplungswerk Dresden GmbH will not be liable and no guarantee will apply.