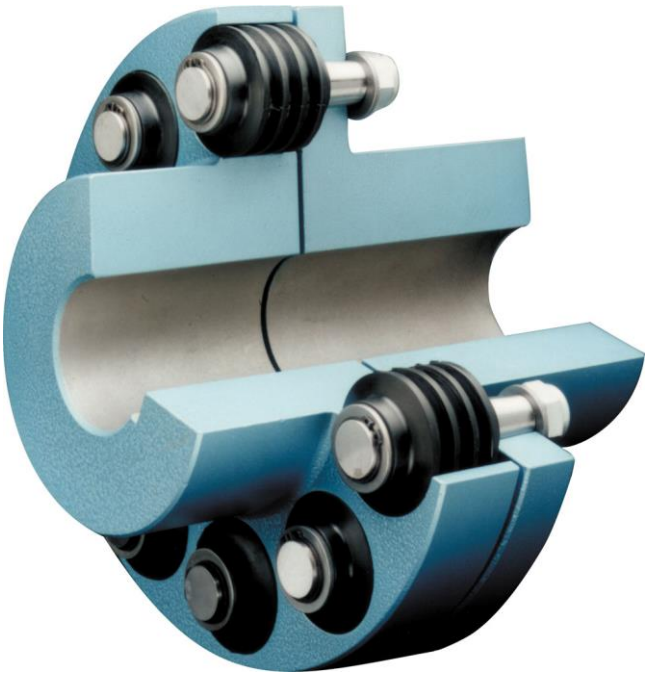
Operation manual

Flexible pin type coupling

according to

KWN 22014



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Safety and Information Symbols

Danger! **Danger of injury to personnel**

Attention! **Follow instructions**

1. General and Safety instructions

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.

1.1. Safety instructions

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.
- All work must be performed according to the principle “safety first”.
- 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). A warning sign must be affixed to the switch-on device when work is performed on the coupling.
- 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 by means of appropriate protective equipment.
- Due to the emergency running properties the coupling has, metal contact may cause sparks to form in the event of the flexible transmission elements seizing up. This characteristic must be taken into account by the operator or project planners if the coupling is to be used in potentially-explosive atmospheres or machinery. To eliminate the risk of explosion, care must be taken that the permissible extent of wear is not exceeded, that the maximum permissible deviations are observed, and overloading is avoided.

Information related to the correct assembly, start-up, and operation can be obtained from this OM under consideration of the warning notices.

1.2. Information on the Machine Directive 2006/42/EG

As defined by the EG-Machine Directive 2006/42/EG, KWD-couplings are to be categorized as components. KWD is therefore not obliged to issue a declaration of incorporation.

2. Transport and Storage

The contents of the delivery are listed in the delivery papers. The delivery must be checked for completeness upon receipt. Possible transport damage and incomplete delivery must be reported immediately in writing. The coupling is delivered in individual components or subassemblies ready for installation.

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.

The couplings are delivered with temporary corrosion protection, allowing, under the above described conditions, storage of up to 6 months from the date of delivery.

Alle elastischen Elemente sind vor atmosphärischen Einflüssen zu schützen.

In case of possible damage the coupling may not be put into operation.

3. Function

Flexible bolt couplings are torsionally-elastic couplings which even out radial, axial and angular misalignments in the shafts to be connected. The torque is transmitted through the flexible buffers and the corresponding buffer bore holes in the buffer section. The service life of the buffer depends on the type of drive, the temperatures at the coupling and the existing misalignments.

The operating temperature range is between -40 °C to +100 °C.

Flexible pin type couplings are supplied in the following designs:

Design A:	Standard
Design P:	with break drum
Design S1:	with break disk
Design S2:	with radially removable brake disk
Design H:	with spacer

The couplings are supplied with the individual buffer section and in
Design A: the bolt section is complete with buffer and bolts
Design P: the brake drum is complete with buffer and bolts
Design S1, S2: the brake disk is complete with buffer and bolts
Design H: the hub and spacer are complete with buffer and bolts

The radial and angular displacements to be balanced by the couplings result from the displacements which have occured in the installation process or during their operation and must not exceed the values are specified in the coupling leaflet.

4. Assembly

The fitting position and the arrangement of the coupling halves on the driving or the driven side is optional. However, in the case of vertical fitting the appropriate measures must be taken to secure both coupling halves axially. Flexible bolt couplings must be provided with a cover against unintentional touch.

4.1. Mounting the coupling parts

A distinction must be made here between designs A, P, S1, S2 and design H.

The following applies to all designs:
1. marking of the fixation and position of the parts to each other in balanced assemblies
2. Remove the preservative and degrease shaft ends and hub bores
3. Prepare the shaft ends for the assembly of the coupling.
4. Fit the hubs together with the sleeves using a fitting device or suitable tools (When installing vertically, secure the upper hub against slipping down).
   - It is possible to facilitated the assembly process by heating the hubs evenly by means of an appropriate heat source (for fit tolerance H7/k6 respectively H7/m6 up to 80°C [150° C]). The buffers and bolts must first be removed.
5. Observe the sequence of the assembly parts.

Attention !
Never force the hubs or flange hubs on by hitting them! Tighten adjusting screws only with original tools!

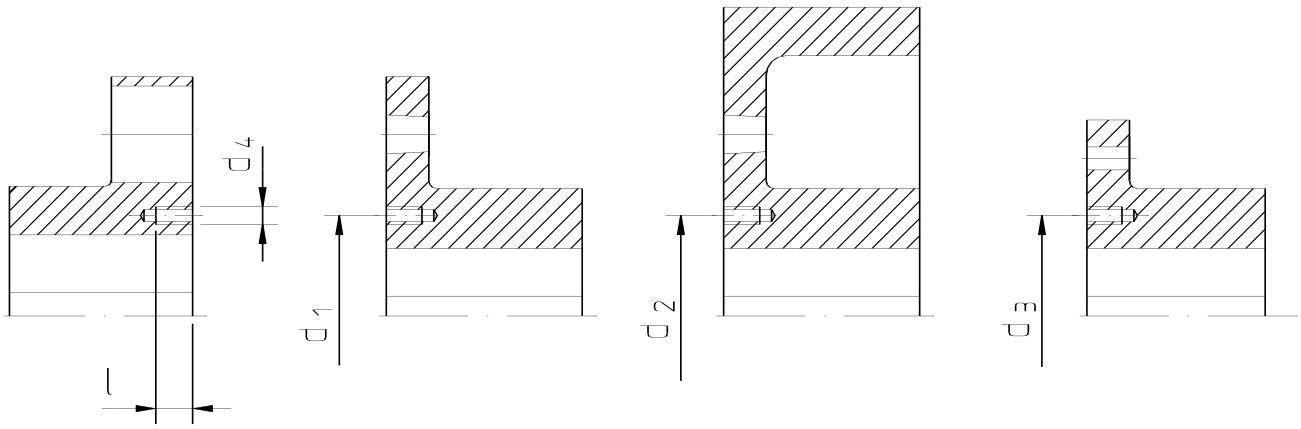
6. Put the devices or aggregates in close position to each other and align them with the clearance e_1 (see coupling leaflet).

In nominal size 1000 and larger, the bolts and buffer parts or brake drums (design P) and the hubs (design H) may be provided with threading to facilitate removal (see picture 1 or table 1 for position and size of tapped holes.)

Table 1

	Nominal size										
	1000	1600	2500	4000	6300	10000	16000	25000	40000	63000	100000
d1	150	183	205	230	258	273	336	384	432	432	480
d2	176	176									
d3	150	183	205	230	258	273					
d4	M 20		M 24		M 30						
l	30		35		40						

Picture 1



buffer part design A | bolt part design A | brake drum design P | hub design H

Features peculiar to design H:
Spacer and hub can be separated by loosening the screwed connection. The buffer section and the hub must be mounted as described above. The spacer can now be screwed to the hub again. The tightening torque's are listed in table 2.

Table 2

Nominal size	4 6,3 10 16	25 40 63	100 160	250 400	630 1000	1600 2500	4.000	6300 10000
Tightening torque (Nm)	14	34	68	117	285	558	961	1.050

4.2. Aligning the coupling elements

Having mounted the coupling elements, the axial, radial and angular alignment of the coupling must be attained. Different methods can be used depending on the degree of accuracy necessary (see section 4.2.1 and 4.2.2).
In general the extent of the remaining alignment error has a decisive influence on the service life of the flexible components.

Table 3.1: permissible gap dimension

	design A, S, P	**design H**
Nominal size	Maximum dim. and minimum e_1	Maximum dim. and minimum e_1
4	1,5 ± 1	2 ± 0,5
6,3	1,5 ± 1	2 ± 0,5
10	2 ± 1	2,5 ± 0,5
16	3 ± 1	3,5 ± 0,5
25	3 ± 1	3,5 ± 0,5
40	3 ± 1	3,5 ± 0,5
63	3 ± 1	3,5 ± 0,5
100	3,5 ± 2	4 ± 0,5
160	4 ± 2	4 ± 0,5
250	4 ± 2	4 ± 0,5
400	5 ± 2	6 ± 1
630	5 ± 2	6 ± 1
1.000	7 ± 2	8 ± 1
1.600	7 ± 2	8 ± 1
2.500	11 ± 4	12 ± 3
4.000	18 ± 4	18 ± 4
6.300	18 ± 4	18 ± 4
10.000	18 ± 4	18 ± 4
ab 16.000	18 ± 4	-

The permissible operational displacements in table 3.2, i.e. with the unit running, depend on the operating speed. As the speed increases, the permissible values are to be reduced by multiplication with the speed factor f_n according to table 3.3. The displacement values ΔK_a, ΔK_r and ΔK_w* may occur simultaneously. The axial misalignment ΔKa must not exceed a frequency of 10 Hz must not be exceeded.

Table 3.2: permissible displacements during operation

	permissible displacements at speed 500 1/min		
Nominal size	ΔK_a in mm	ΔK_r in mm	ΔK_w* in mm
4	0,25	0,25	0,27
6,3	0,27	0,27	0,31
10	0,30	0,30	0,33
16	0,32	0,32	0,34
25	0,33	0,33	0,35
40	0,35	0,35	0,37
63	0,38	0,38	0,38
100	0,44	0,44	0,46
160	0,48	0,48	0,47
250	0,52	0,52	0,53
400	0,58	0,58	0,54
630	0,64	0,64	0,63
1.000	0,73	0,73	0,74
1.600	0,81	0,81	0,86
2.500	0,91	0,91	1,00
4.000	1,08	1,08	1,06
6.300	1,13	1,13	1,11
10.000	1,30	1,30	1,29
16.000	1,52	1,52	1,52
25.000	1,78	1,78	1,82
40.000	2,12	2,12	2,23
63.000	2,48	2,48	2,69
100.000	3,42	3,42	3,33

Table 3.3: speed factor for reduction of the displacements during operation

	speed in 1/min				
	500	1000	1500	2000	>=3000
speed factor f_n	1	0,75	0,62	0,55	0,43

Once the coupling has been aligned, the buffers and bolts must be mounted again. The nuts must be tightened with the torque's shown in table 4.

Table 4

Nominal size	Tightening Torque	
	design A, P, H	**design S1, S2**
4; 6,3	2,4	-
10	4	-
16 - 63	9,8	43
100	36	85
160, 250	36	172/187
400; 630	90	340/372
1000, 1600	308	1053/1142
2.500	400	2.150
4000 - 100000	400	-

4.2.1. Aligning with a hairline gauge, feeler gauge or measuring wedge

At 3 points each 120° away from the others, check the actual distance "e_1" between the buffer and the bolt part using a measuring wedge or feeler gauge and then align them to an even measurement. The actual measurement of "e_1" must lie within the limits given in table 3.1. the shaft ends are aligned by acquiring the same measurement "e_1" and resting the hairline gauge in the light gap on both sides.

Picture 2

Axial misaglignment e_1 *Radial misaglignment ΔKr* *Angular misaglignment ΔKw*

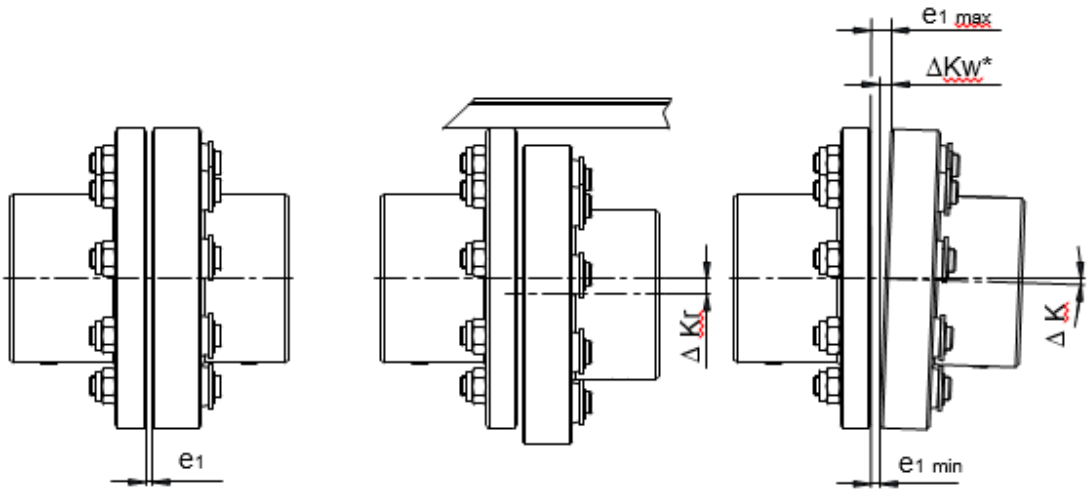


illustration corresponds to design A ΔKr

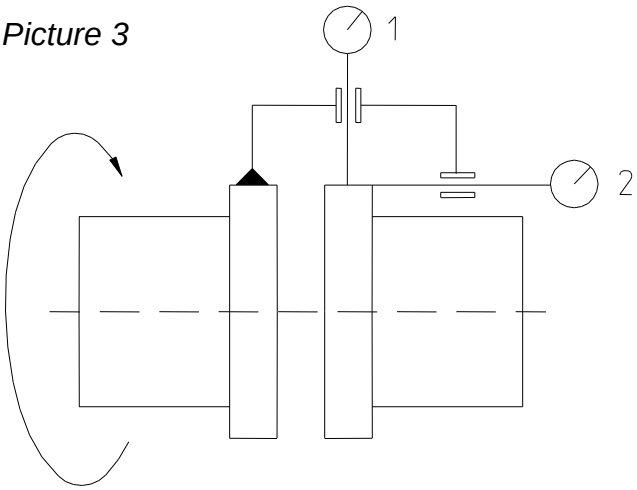
$\Delta Kw^* = e_{1\,max} - e_{1\,min}$

4.2.2. Aligning by means of a dial gauge and instrument

For higher requirements, the alignment must be carried out with a dial gauge and fixture according to Figure 3. The permissible values can be found in table 3.2 or 3.3.

dial gauge 1: half difference between the maximum and the minimum deflections of the needle corresponds to ΔKr
dial gauge 2: difference corresponds to ΔKw*

Picture 3



5. Commissioning

Improper use and modifications of the coupling that have not been approved by KWD will render the manufacturer's warranty null and void. This also applies to the use of spare parts other than original spare parts by KWD.

Original KWD spare parts must be used exclusively.

Check and, if required, retighten all screw connections prior to putting the coupling into operation.
Finally, protection against accidental contact must be provided. If there is a change in the noises coming from the coupling during operation or it starts to vibrate. The drive must be turned off and the cause eliminated.
If no cause of the noise or vibration is found, consult the customer service of the manufacturer!

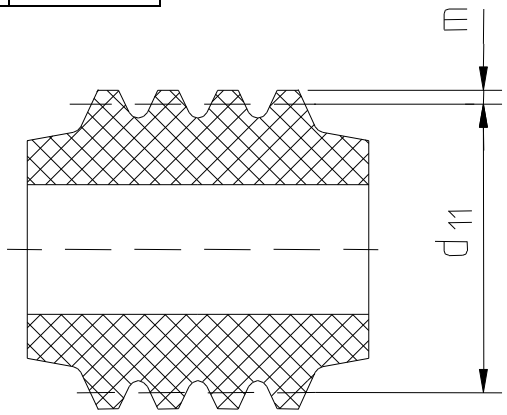
The following visual checks must be performed during commissioning:
- Check that rotating parts do not contact anything
- Check for unusual noise

6. Maintenance and repair

Maintenance on the flexible bolt coupling is restricted to checking the extent of wear in the buffers and the actual misalignment. If the wear is extensive, (see table 5 for measuring wear) or if the buffers are damaged, they must be replaced by a complete set.

Tabelle 5

Nominal size	dimension m	d 11
6	1,35	11
8	2,85	14
10	3,25	18
14	3,2	28
16	4,6	30
22	7	40
30	6,8	60
42	9	85
65	13,5	120



In design S2 the brake disk can be removed radially without moving the coupling parts. The buffers and the bolts must be removed first and the two locking screws loosened.

6.1. Dismantling bolts design A, P, H

The bolts are fitted with a thread for dismounting. By using these threads the dismounting of the bolt can be facilitated. Size and length of the thread are given in the following table 6.

Table 6

Bolt Nominal size	Thread	Length
6	-	-
8	-	-
10	-	-
14	M8	12
16	M8	12
22	M8	12
30	M8	12
42	M12	20
65	M24	30

6.2. Special features according to design H

It is possible to remove the spacer radially from this design without moving the drive units. The requirement is compliance with the alignment value e_1 – see table 3.1 (design H).

1. Remove the buffers and bolts.

2. Loosen the screwed connection between the spacer and the hub.

3. Move the spacer towards the buffer part axially.

4. Take out the spacer radially.

7. Spare parts

Specified spare parts for flexible bolt couplings: buffers and bolts. The size and quantity can be found in the product standard.

Change notes:

Revision	Date	Changes
A	12/11/1998	First issue
B – I		Adjustment of values and format adaptations
K	12/09/2019	Format adaptations, TÜV mark removed
L	16/03/2020	Chapter 2.2 added. English, German, Polish version adapted
M	09/06/2020	Spanish version adapted
N	23/09/2020	Slovenian translation
O	22/04/2021	- alignment values design H added (table 3.1) - permissble displacements during operation revised (table 3.2) - speed factor added (table 3.3) - in chapter 4.2.1: Picture 2 added