

Operation Manual

Flexible Claw couplings

according to
KWN 22013



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Safety and Information Symbols



Caution!

Reference to explosion protection



Danger!

Danger of injury to personnel



Attention!

Follow instructions

1. Specifications



The owner/operator must comply with the technical specifications established for the operation of the described coupling. The technical specifications are shown in the current specification leaflet, which at the same time represents the works standard of Kupplungswerk Dresden GmbH, as well as, in certain justified cases, available in form of a drawing.

Couplings for operation under normal operating conditions are not delivered with special identification markings, in contrast to those for operation in a potentially explosive atmosphere in accordance with Directive 94/9/EU.

2. General



The flexible claw couplings ELKU-N are considered as components in the context of the EG Machinery Directive 2006/42/EG.

Therefore, no declaration of incorporation can be issued by KWD.

This Operation Manual (OM) is a constituent part of the scope of delivery of the coupling, and it may also be viewed on the Internet website of the manufacturer (<http://www.kupplungswerk-dresden.de>).

This operation manual must always be kept available in the vicinity 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 described couplings correspond to the technical state-of-the-art at the time of printing of this OM.

We reserve the right to make changes to individual components and accessories in the course of advanced development, while maintaining essential characteristics, for the improvement of capabilities and safety.

3. Safety

The coupling has been designed and built in accordance with the current state-of-the-art and is delivered in operationally safe condition. The coupling may only be installed and operated as stipulated in the delivery contract and performance specifications as well as according to markings complying with the conditions of the Directive 94/9/EG.

Identification markings of couplings for use in a potentially explosive atmosphere in accordance with Directive 94/9/EG:

II 2 G IIB T5 ($-20^{\circ}\text{C} \leq T_a \leq 50^{\circ}\text{C}$)
II 2 D 90°C ($-20^{\circ}\text{C} \leq T_a \leq 50^{\circ}\text{C}$)



Unauthorized modifications are prohibited. This also applies to protective devices installed as protection against accidental contact.

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.



Rotating drive components must be secured against accidental contact by means of appropriate protective equipment.



Prior to installation of a protective hood, a risk analysis should be performed in order to prevent the creation of ignition sources. This analysis is not part of the scope of delivery by the manufacturer of the coupling.



All add-on parts must meet the conditions of Directive 94/9/EG. Monitoring devices not complying with the directive must be operated with an isolating switch.



When installing the coupling in another machine or system, the manufacturer of this machine or system is obliged to integrate the instructions contained in this OM in the OM of his machine or system.

This coupling complies with the conditions of Directive 94/9/EG.

No explosive gas mixtures and dust concentrations must be present during installation or disassembly work.

4. 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.



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

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.



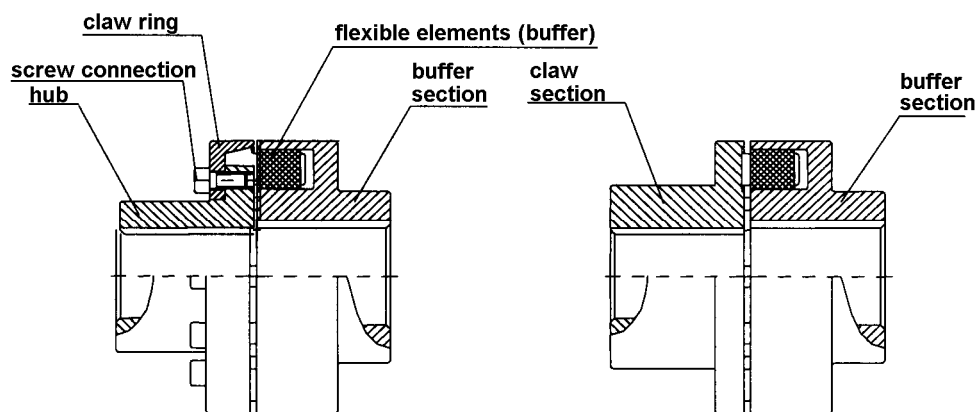
In case of subsequent painting, the accepted rules of explosion protection must be observed and complied with.

5. Technical description

Fig. 1 Versions

Design A

Design B



The flexible claw coupling N (ELKU-N) is a non-positive torsionally flexible coupling, which can balance out radial, axial and angular displacement between the shaft ends. In design A the coupling can be separated without moving the units by loosening the screw fittings and pushing the claw ring. The coupling is equipped with flexible buffers.

6. Installation

The instructions in Section 3 „Safety“ must be observed!



Specifications deviating from works standards must always be taken from the corresponding drawing and are binding!



A potentially explosive atmosphere must not be allowed to exist during installation of the coupling.

The coupling must be installed with the utmost care by properly trained and authorized personnel. Damages as a consequence of inexpert installation result in the exclusion of manufacturer's liability. Care must be taken to ensure that a sufficient amount of space is provided around the coupling for subsequent service and repair work.



The owner/operator must make certain that no foreign objects impair the function of the coupling (for example, falling objects, pouring, etc.).

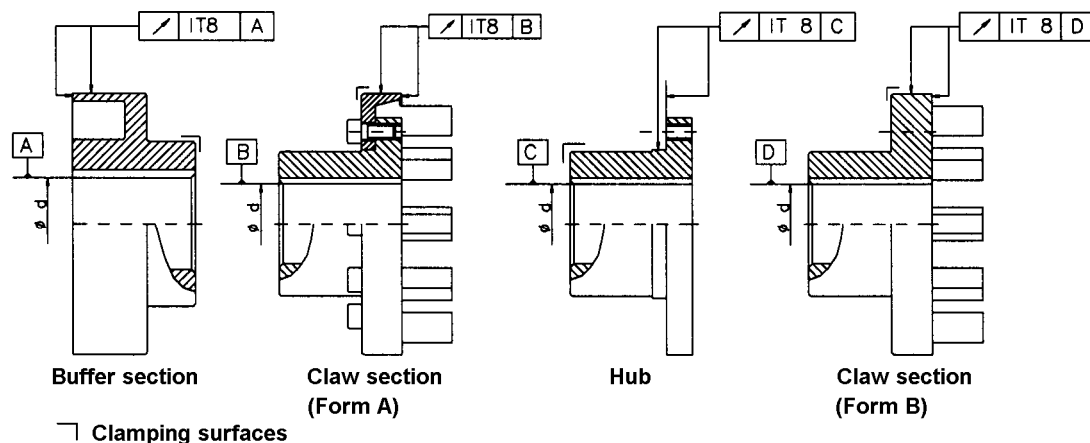
6.1. Putting in finished bores/feather keyways/treaded holes

If the coupling has a pilot bore on delivery, it is necessary to finish the bore and insert a feather keyway and if required a treaded bore for the setscrew. Before starting work, remove the flexible elements and clean the parts with sealing agents.

6.1.1. Producing the finished bore

The machine parts must be carefully aligned before the finished bores are produced. Here radial run-out (lateral run-out) must be observed according to the standard tolerance IT 8 (DIN¹ ISO 286). The parts must be held in the areas marked in figure 2.

Figure 2: Run-out



The finished bore holes must be smaller than or equal to the maximum bore holes (see leaflet). The maximum bore holes apply to feather keyways as per DIN 6885 sheet 1. If you use other means of connecting the shaft and hub, please consult the manufacturer. The following is recommended for fitting the shafts/hubs:

Table 1: Fit allocation

Diameter Area	Shaft	Hub
up to 50 mm	k 6	H7
larger than 50 mm	m 6	H7

The shaft tolerances correspond to those given in DIN 748 sheet 1. Other fit combinations are possible. If fit combinations are chosen which cause overdimensioning, it is essential to check the resulting hub load. We can do the corresponding calculations for you.

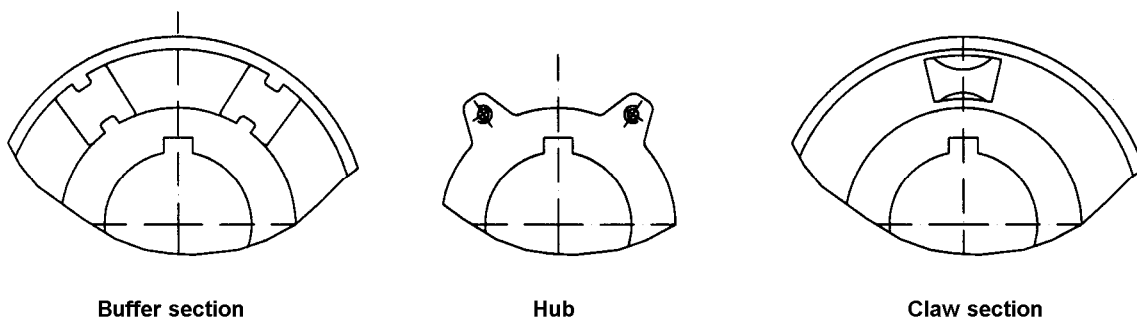


Excessive overdimensioning can destroy the coupling!

6.1.2. Production of feather keyway

When introducing the feather keyway, attention must be paid to the orientation of the feather keyway in the respective section. See the following figure 3 for the position of the feather keyways.

Figure 3: Position of the feather keyway



Axial fixation of the coupling parts

Axial fixation can be done by means of end plates or setscrew. Please consult the manufacturer if you use end plates.

6.1.3. Production of thread for setscrew:

Axial fixation is done with a setscrew (threaded pin DIN 916): The position and the size of the threaded bore can be found in fig. 4 or table 2. The length of the setscrew should not exceed 1.2 x diameter of the thread or should not project over the threaded pin.

Fig. 4: Position of the threaded bore holes

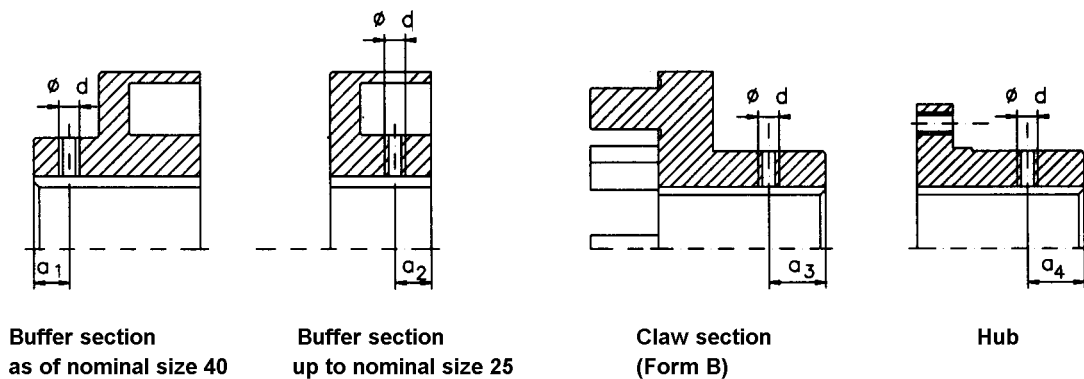


Table 2: Dimensions and position of the threaded holes

NG	2,5	4	6,3	10	16	25	40	63	100	160	200	250	400	500	630	1000	1250	1600	2500	3150	4000	5000	6300	
d	M5	M6	M6	M6	M6	M8	M8	M10	M12	M12	M12	M16	M16	M16	M20	M20	M24	M24	M24	M24	M24	M24	M24	M24
a ₁	-	-	-	-	-	-	13	13	16	20	22	24	28	35	40	50	60	70	80	75	85	100	115	
a ₂	10	10	11	15	18	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
a ₃	8	8	12	15	18	20	22	25	32	40	40	45	45	-	-	-	-	-	-	-	-	-	-	-
a ₄	-	-	-	-	9	12	15	20	30	30	35	40	45	50	60	70	80	90	100	100	110	130	140	

The thread diameter d is the guideline. Larger ones may be used if the feather keyways are wider and if there is sufficient screwing depth.

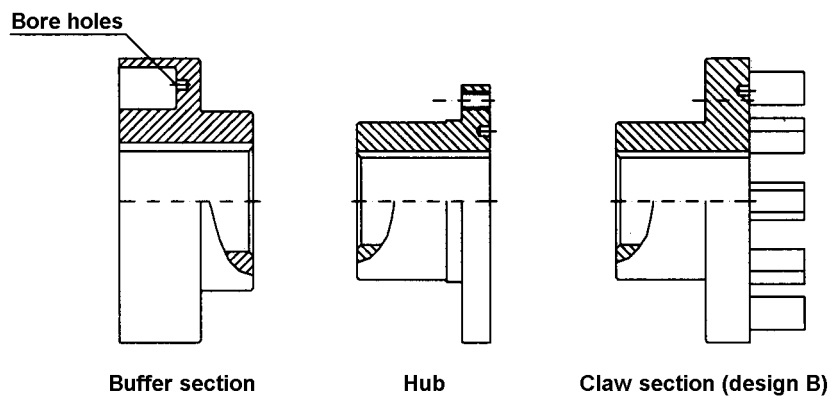
6.1.4. Balancing

Pre-bored coupling parts are supplied in unbalanced state! If required by the application, the coupling parts may be balanced. The following parts should be balanced in each case:

- buffer section
- claw section (design b) and
- hub and claw ring mounted (design a)

The position of the compensatory bores can be taken from the following fig. 5. The compensatory bores should be arranged on the largest possible radius.

Fig. 5: Arrangement of the compensatory bores



On no account should the bore holes be bored through completely in the buffer section.

6.2. Mounting the coupling parts



A potentially explosive atmosphere must not be allowed to exist during cleaning of the coupling.



Provide sufficient ventilation. Avoid any kind of ignition sources! Always observe the instructions by the manufacturer of the cleaning agent when using solvents or cleaning agents.

Before beginning work, the shaft ends and hub bore holes must be cleaned. Suitable aids must be used to mount the coupling parts.

The parts may be heated to ease assembly (up to a max. 150! C). the elastic elements must be removed first in that case.



Attention! Danger of burns!



Attention!

Driving the hubs or flanged hubs onto the shafts by force is not permissible!

Never strike coupling parts when assembling! The sets crews may only be tightened with a hexagon socket spanner. On no account should an extension be used!

6.3. Alignment of coupling parts



The alignment accuracy of shaft axes to each other is essential for the service life of the couplings. The values for permissible displacements must be complied with (see works standard or Table 1).



If couplings are operated in a potentially explosive atmosphere, the values for maximum deflection must be halved in order to guarantee that the coupling components do not represent a source of ignition by colliding with each other.

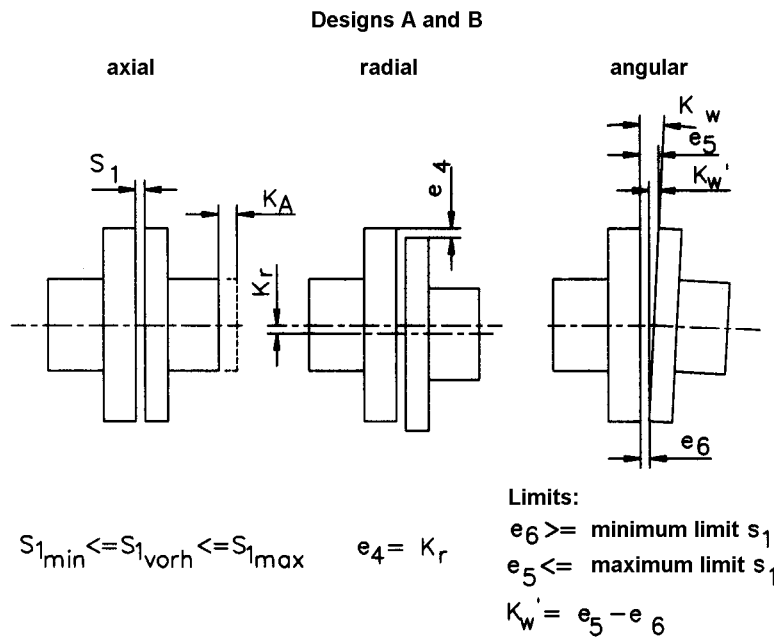


Failure to follow this instruction may result in rupturing of the coupling, with consequential possible danger to life and limb of personnel.

After assembling the coupling halves, the units are pushed together. The drive and the output must be aligned now. In principle, the coupling can. offset displacement up to a certain height. However, alignment should be done in such a way that there is as little remaining displacement as possible. This has a positive effect on the service life of the elastic elements and on the coupling's restoration reaction.

The type and extent of the permissible displacement can be found in figure 6 and Table.3.

Figure 6: Types of displacement



The given values (K_r K_w') are maximum values. If displacement occurs at the same time, the values can only be applied proportionally. Please ask the manufacturer!

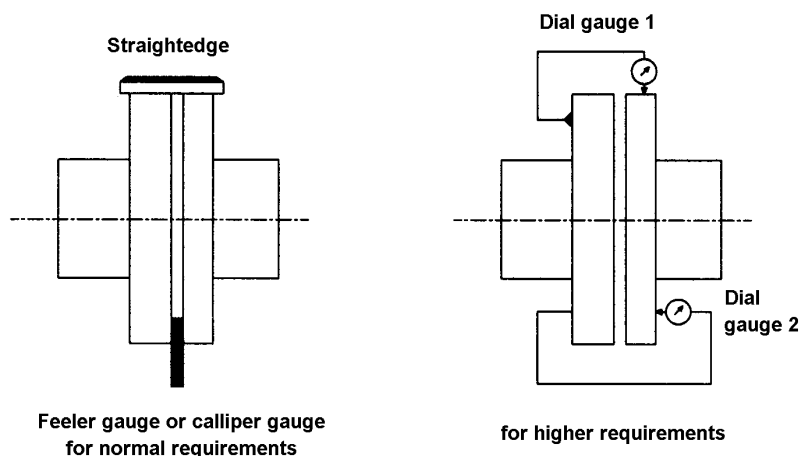
Table 3: Permissible displacement

NG	bis 1500 min ⁻¹		bis 2000 min ⁻¹		bis 3000 min ⁻¹		bis 4000 min ⁻¹		bis 5000 min ⁻¹		S ₁
	K _r	K _w '	K _r	K _w '	K _r	K _w '	K _r	K _w '	K _r	K _w '	
2,5	0,1	0,5	0,05	0,27	0,04	0,22	0,04	0,19	0,03	0,17	2 - 4
4	0,15	0,6	0,08	0,33	0,07	0,27	0,06	0,23	0,05	0,21	2 - 4
6,3	0,15	0,7	0,08	0,38	0,07	0,31	0,06	0,27	0,05	0,24	2 - 4
10	0,2	0,85	0,11	0,47	0,09	0,38	0,08	0,33	0,07	0,29	2 - 4
16	0,2	0,95	0,11	0,52	0,09	0,42	0,08	0,37	0,07	0,33	2 - 4
25	0,25	1,1	0,14	0,6	0,11	0,49	0,1	0,43	0,09	0,38	2 - 4
40	0,25	1,2	0,14	0,66	0,11	0,54	0,1	0,46	-	-	2 - 4
63	0,3	1,4	0,16	0,77	0,13	0,63	0,12	0,54	-	-	2 - 6
100	0,3	1,55	0,16	0,85	0,13	0,69	-	-	-	-	2 - 6
160	0,3	1,75	0,16	0,96	0,13	0,78	-	-	-	-	2 - 6
200	0,35	1,95	0,19	1,07	0,16	0,87	-	-	-	-	2 - 6
250	0,35	2,2	0,19	1,2	-	-	-	-	-	-	3 - 8
400	0,4	2,45	0,22	1,34	-	-	-	-	-	-	3 - 8
500	0,4	2,75	0,22	1,51	-	-	-	-	-	-	3 - 8
630	0,4	3,1	-	-	-	-	-	-	-	-	3 - 8
1000	0,45	3,5	-	-	-	-	-	-	-	-	3 - 8
1250	0,45	3,85	-	-	-	-	-	-	-	-	5 - 10
1600*	0,5	4,2	-	-	-	-	-	-	-	-	5 - 10
2500*	0,5	4,55	-	-	-	-	-	-	-	-	5 - 10
3150*	0,8	4,9	-	-	-	-	-	-	-	-	6 - 12
4000*	0,9	5,3	-	-	-	-	-	-	-	-	6 - 12
5000*	1	5,7	-	-	-	-	-	-	-	-	6 - 12
6300*	1,2	6,2	-	-	-	-	-	-	-	-	6 - 12

* Observe rotational speed limit!

Measurement of existing displacement

Fig. 7: Measurement of displacement



Measurements are taken at points which are 180° in relation to each other and at several points along the circumference. For normal requirements it is sufficient to align with a straightedge and feeler gauge or calliper gauge. The coupling is aligned properly as soon as the gaps are equally large (along the circumference) and S_1 lies within the limits for S_1 . Dial gauges may be used if a higher quality of alignment is required. In that case, the coupling half onto which the dial gauges are attached remains stationary and the other is turned. The differences in the deflection of the dial gauge needles correspond to the existing displacement

- dial gauge 1: radial displacement K_r
- dial gauge 2: angular displacement K_w'

The remaining displacement must be less than the permissible values in table 3.



Specifications deviating from works standards must always be taken from the corresponding drawing and are binding!

After completed alignment the aggregates are locked in their final position.



Rotating drive components must be secured against accidental contact by means of appropriate protective equipment.



Prior to installation of a protective hood, a risk analysis should be performed in order to prevent the creation of ignition sources. This analysis is not part of the scope of delivery by the manufacturer of the coupling.

All ad-on parts must comply with Directive 94/9/EG.

7. 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.



The tightening torque values for the screws are shown in Table 4 or the corresponding drawing and are binding!

Table 4: Tightening torque values

NG	16	25	40	63	100	160	200	250	400	500	630	1000	1250	1600	2500	3150	4000	5000	6300
M _A	14	18	32	40	46	80	90	145	185	200	260	340	420	550	670	710	1450	1450	1450
Nm																			

For nominal sizes 16 - 200 the tolerance is ± 2 Nm, for nominal sizes 250 - 1000 A tolerance of ± 5 Nm applies and for the remaining nominal sizes the tolerance is ± 10 Nm. It is also necessary to check the alignment of the coupling.

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 for existence of Ex markings



- Check that rotating parts do not contact anything
- Check for unusual noise
- Refer Trouble Shooting for instructions on how to eliminate the causes of possible operating trouble.

8. Maintenance

The instructions in Section 2 „Safety“ and Section 9 „Trouble Shooting“ must be followed. Maintenance must be performed with the utmost care by properly trained and authorized personnel.

Essentially, maintenance work consists of:

checking shaft displacement – re-alignment
checking the elastic elements



If a technical drawing exists for the coupling, the specifications shown in the drawing are binding!



The coupling must be protected against falling objects.



Check protective devices of rotating parts for proper seating and function. Any contact with rotating parts is not permissible.

Flexible claw couplings N are maintenance free. The service life of the coupling mainly depends of the extent of wear on the flexible elements. We recommend you to check the state of wear and misalignment for the first time after 500 hours of operation.



In case of couplings operated in a potentially explosive atmosphere, significantly shorter maintenance intervals are required! Couplings must be checked approx. after every 200 hours of operation or at least once a month!

If the buffers are extensively worn or cracked, they must be replaced by a complete set. If the misalignment is greater than permissible, the coupling must be re-aligned.

The state of wear is evaluated by checking the circumferential backlash (see table 5 for limit values).

Fig. 8 shows how the circumferential backlash is measured. the torque-free coupling parts are turned in opposite directions as far as they can go, until there is no more coupling clearance. A mark is made on both coupling parts.

Both coupling parts are then turned again as far as they can go in the opposite direction. the marks are staggered as a result. The cord measurement for the displacement may not be greater than the degree of wear in table 5. If is, the entire buffer set must be replaced.

Fig. 8: Measuring the extent of wear

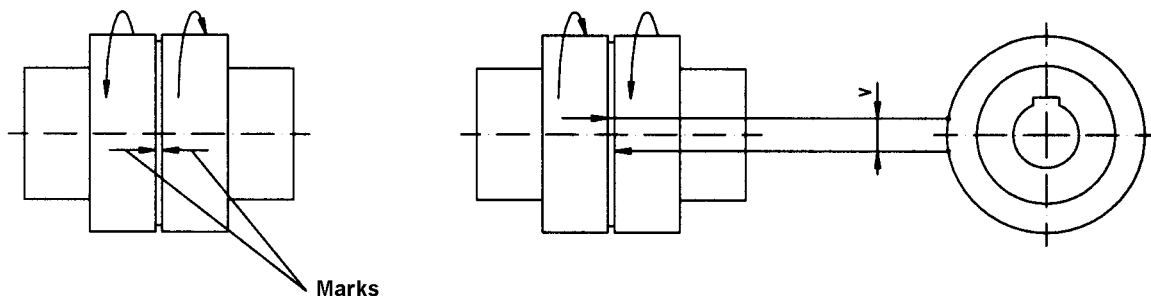


Table 5: Limit values for wear

Kupplungsgröße	2,5	4	6,3	10	16	25	40	63	100	160	200	250
Verschleißmaß "v" in mm	5,5	5,5	5,0	6,0	7,0	8,0	8,0	8,0	8,0	8,5	9,0	10,0
Kupplungsgröße	400	500	630	1000	1250	1600	2500	3150	4000	5000	6300	
Verschleißmaß "v" in mm	11,5	10,5	11,5	13,0	14,0	15,5	17,5	17,5	19,5	21,0	22,5	

8.1. Spare parts

The flexible elements are available as spare parts. Buffers: the respective nominal sizes of the buffers and their quantities can be taken from the following table.

Table 6: Spare parts

NG	Puffernengröße	Anzahl	NG	Puffernengröße	Anzahl
2,5	2,5	4	400	400	8
4	4	5	500	500	9
6,3	4	6	630	630	9
10	10	6	630	630	9
16	16	6	1000	1000	10
25	25	6	1250	1250	10
40	40	6	1600	1600	10
63	63	7	2500	2500	10
100	100	8	3150	3150	10
160	160	8	4000	4000	10
200	200	8	5000	5000	10
250	250	8	6300	6300	10

8.2. Cleaning of coupling parts



A potentially explosive atmosphere must not be allowed to exist during cleaning of the coupling.



Provide sufficient ventilation. Avoid any kind of ignition sources! Always observe the instructions by the manufacturer of the cleaning agent when using solvents or cleaning agents.

9. Trouble Shooting



If a technical drawing exists for the coupling, the specifications shown in the drawing are binding!

9.1. General

The operating trouble described in Section 9.2. are merely intended as clues the purpose of trouble shooting. If the coupling is installed in a complex machine and system, these must be included in locating the source of trouble.

The coupling must run noiselessly and vibration free under all operating conditions.



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.



The coupling must always be shut down for the purpose of trouble shooting. The motive power aggregate must be secured against accidental restarting and a sign must be affixed to the main switch indicating that work is in progress on the coupling.

9.2. Elimination of possible trouble

Symptom	Probable cause	Indication of danger in explosive atmosphere	Corrective action
<ul style="list-style-type: none"> - Vibrations - Changed or unusual running noise 	<ul style="list-style-type: none"> - Permissible displacement values exceeded - Coupling is not being operated under specified operating conditions 	<ul style="list-style-type: none"> - Risk of ignition by sparking caused by metal to metal contact of the components 	<ul style="list-style-type: none"> - Shut down the machine or system - Check and, if required, correct alignment and installation dimension of the coupling
<ul style="list-style-type: none"> - Excessive wear of the elastic elements 	<ul style="list-style-type: none"> - Coupling is not being operated under specified operating conditions - Permissible displacement values are exceeded 	<ul style="list-style-type: none"> - Hot surfaces and sparking lead to risk of ignition - Risk of ignition by sparking caused by metal to metal contact of the components 	<ul style="list-style-type: none"> - Shut down the machine or system - Check and, if required, correct alignment and installation dimension of the coupling
<ul style="list-style-type: none"> - Increased operating temperature 	<ul style="list-style-type: none"> - Coupling is not operated under specified operating conditions - Permissible displacement values are exceeded 	<ul style="list-style-type: none"> - Hot surfaces and sparking lead to risk of ignition - Risk of ignition by sparking caused by metal to metal contact of the components 	<ul style="list-style-type: none"> - Shut down machine or system - Check and, if required, correct alignment and installation dimension of the coupling

10. Concluding Remarks

Special custom designs of flexible Claw coupling available upon request.

Table of modifications

Edition	Date	Modification
M	17.06.2013	Revision/completion

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