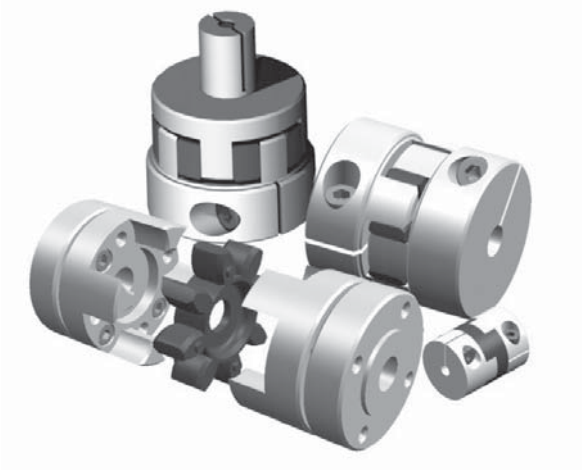
Elastomer couplings I General

Definition – Elastomer couplings:

Elastomer couplings can be plugged in, are backlash free, flexible shaft-couplings for small to medium torques. A elastomer spider serves as connection and compensation element with involute-shaped teeth and high Shore hardness. This is inserted form fitting, with slight preload between two high precision machined hubs with involute shaped jaws. The elastomer spider can compensate slight shaft misalignments, is electrically insulating and demonstrates a good oscillation dampening characteristic. Two variations with backlash free, frictional shaft-hub connection are available as standard which ensure a safe torque transfer, even without keyways.



Characteristics – JAKOB Elastomer couplings:

- plug-in, backlash free, flexible, compact
- oscillation dampening
- different shore hardness
- low moment of inertia
- high speed
- electrically insulating
- temperatures up to 120°C

Standard series:

- Series EKM with easy to fit aluminium radial clamping hub
- Series ESM-A with aluminium conical hub, high speed, small shaft diameters
- Series EKS with expanding cone and radial clamping hub, short design
- other combinations available on request

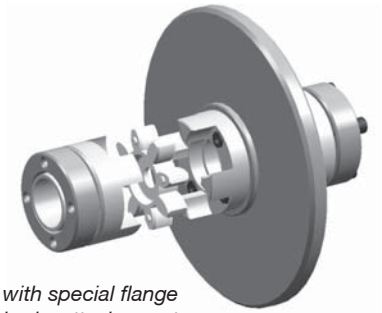
Material:

In the interest of ensuring a favourable mass moment of inertia, the hub parts in the EKM and ESM-A series are made of high-strength aluminium. Tempered steel is used for the tapered ring in the ESM-A series and for the expansion cone hub in the EKS series for strength reasons. The polyurethane elastomer spider with various Shore hardnesses are distinctly wear-proof, oil and age-resistant and suitable for use in tropical climates.

Application examples:

The possible areas of applications for the elastomer couplings range from demanding drive systems in the general machine design, to applications in the instrumentation and control technology, to the spindle and axis drives of machine tools.

Series EKZ with radial clamping hub at both sides and intermediate pipe (Details see Distance couplings)



Series ESM-A with special flange for brake attachement

Coupling layout:

The important layout criteria are the required drive torque, the necessary torsional stiffness and the dampening characteristic of the coupling. Additionally, the minimum or maximum possible shaft diameter, the admissible temperature range, operating factors and the existing shaft misalignment, particularly the radial displacement, must be taken into consideration. Basically, the selection can be influenced by the coupling size and the hardness of the elastomer spider.

Rough calculation formula:

Roughly, the required coupling torque T_K can be calculated as for the following formula:

$$T_K = T_A \bullet f_D \bullet f_T \bullet f_B \leq T_{KN}$$

T_A = drive torque [Nm]
f_D = torsional stiffness factor
f_T = temperature factor
f_B = operating factor

The calculated coupling torque T_K should not exceed the nominal torque of the selected coupling size. Short term overload up to twice the value of the nominal torque is admissible.
The drive torque results of producer information of drive motor or can be calculated via motor output P_A .

$$T_A = \frac{9550 \bullet P_A}{n_B}$$

T_A = drive torque [Nm]
P_A = motor output [KW]
n_B = motor speed [min^{-1}]

Temperature factor f_T:

Admissible temperature range for continuous operation
PUR 98 Sh - A: -30°C bis +90°C
PUR 72 Sh - D: -20°C bis +120°C

operating temperature	-30°C	+30°C	+50°C	+70°C	+90°C	+110°C
factor f_T		1	1,3	1,6	1,8	2

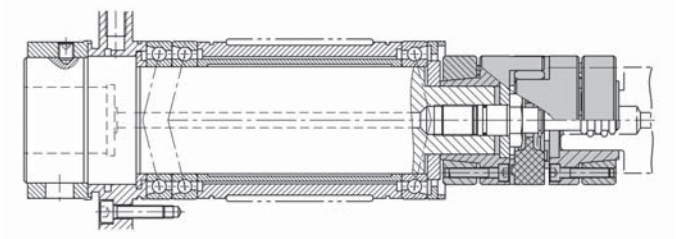
Torsional stiffness factor f_D:

If an exact, accurate transfer of the torque is required, as for instance with servo drives or measuring systems, a high torsional stiffness is absolutely necessary. Here the required drive torque should be multiplied with a operating factor of at least 3 to 10 when selecting the size, or a torsionally stiff metal bellows coupling selected from the extensive coupling range in this catalogue.

Operating factor f_B:

Due to operating factor f_B application specific peculiarities, such as shock loading, are taken into consideration.

Application example:



ESM-coupling: drive of a short bore spindle according to DIN 69002 (design)

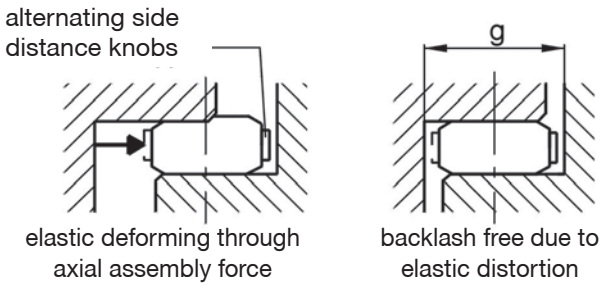
Note on DIN 69002 (design):

Technical data and dimensions of several sizes in the series ESM are according to the specifications of DIN 69002. Therefore, the ESM couplings are particularly suitable for use in spindle drives (i.e. short bore spindles) for high speeds. Low mass moments of inertia and high degree of balance ensure excellent dynamic characteristics. The coupling is prepared for an axial clamping of the spindle bearing, as well as for a central coolant feed through.

Assembly:

The design of the ESM coupling requires mounting of the two hub halves on the shaft ends before the actual plug-in assembly. Here it must be noted, that the mounting screws are tightened evenly crosswise, to prevent surface distortion of the conical clamping ring. Couplings of the EKM series, on the other hand, can be completely assembled before the hub mounting. For mounting the EKM hub only a radially arranged clamping screw must be tightened. Chamfered edges at the face basically also enable a blind assembly with both versions. Due to the obligatory preclamping of the elastomer, an axial assembly force must be applied during the sliding together of the coupling spider and the jaws. This assembly force can be minimised by slight oiling of the spider. For disassembly of the ESM conical hub, pushoff threads are provided for releasing the clamping ring. The relevant tightening torques of the retaining screws can be found in the technical data sheets. The seat shaft-hub is to be selected as transitional seat (e.g. bore Ø28 G6 / shaft Ø28 k6).

Assembly procedure



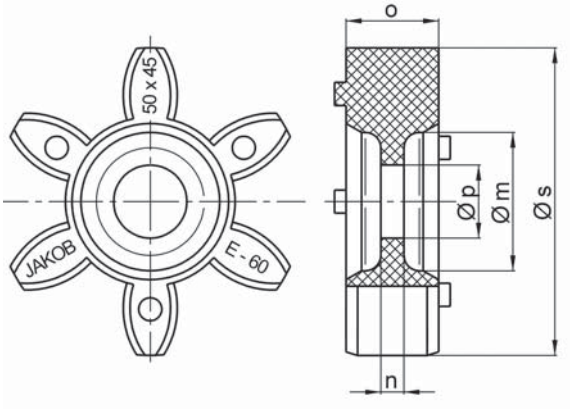
Admissible seat clearance shaft / hub: Series ESM-A: max 0,02 mm Series EKM: min 0,01 mm/max 0,04 mm
(see installation instructions page 7)

Notes:

- The dampening capability of the elastomer spider protects the drive to a high extent from dynamic overload. Both coupling halves are always forced to move (min. $3xT_N$) because of the jaw construction, even if the spider should break down totally (e.g. safety instructions - vertical axis).
- Because of the deformation of the elastomer spider under operation conditions, the housing (bell) should be approximately 5 % bigger than the outer diameter of the coupling itself.
- To ensure satisfactory function, the dimension „g“ should be complied with as exactly as possible. The distance of the two shaft ends can certainly be smaller than „g“ under consideration of the measurements „m“ and „n“ of the spider.
- For additional price, the radial clamping hubs can also be equipped with the easy-to-fit „Easy-Clamp-System“ upon request (see also page 9).
- For smaller shaft diameters, the conical hub of ESM-couplings is additionally slitted.

Dimensions - Elastomerspider [mm]:

Size	øs	øm	n	o	øp$^{+0,5}$
8/10	32	10,5	2	10	8,5
15/17/20/25	40	18	3	12	9,5
30/43/45/50	50	27	3	14	12,5
60/90	55	27	3	14	12,5
150/200	65	30	4	18	16,5
300/320/400	80	38	4	18	16,5
500	100	47	5	22	20,5
700/1000	120	58	6	25	22,5



Material:

- Polyurethan
- 98 Shore – A / Farbe: red
- 72 Shore – D / Farbe: white
- different shore hardness available on request

Note: If required by the customer for special application (e.g. longer shaft plug in depth), diameter „p“ of the inner bore of the spider can be extended up to max. Øm-2mm (upon request).