

Elastomer couplings of series "E" 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:

- **plug-in, backlash free, flexible**
- **elastomer spider with different shore hardness**
- **low moment of inertia, high speed**
- **oscillation dampening**
- **series ESM according to DIN 69002 (proposed)**

Standardseries:

- Series **EKM** with easy to fit radial clamping hub
- Series **ESM** with conical hub and clamping ring for high speeds
- Series **ESM-A** with aluminium conical hub, reduced mass moment of inertia
- Series **EKS** with expanding cone and radial clamping hub, short design
- (other combinations available on request)

Material:

Elastomer spider:..... polyurethane 98 Shore-A (red)
 or polyurethane 72 Shore-D (white)
 alternative elastomer- hardness on request

radial clamping hub EKM: high tensile aluminium

hub ESM:.....heat-treated steel - black finish

conical hub ESM-A:.....high tensile aluminium

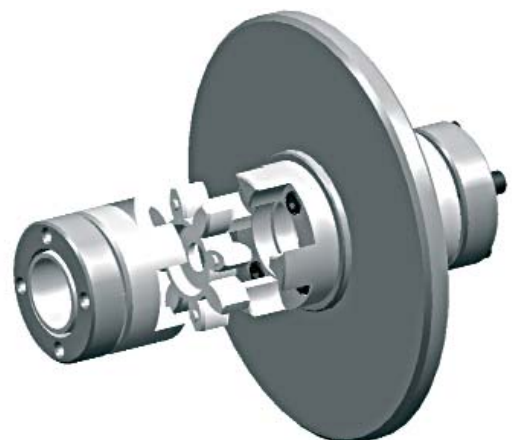
clamping ring ESM:.....heat treated steel-black finish

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 on both sides and intermediate pipe
 (more details under couplings with intermediate shaft)



- Series **ESM** with special flange for brake attachment

Elastomer couplings _____ Dimensioning

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:

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

- 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.

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

- 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° |
| 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

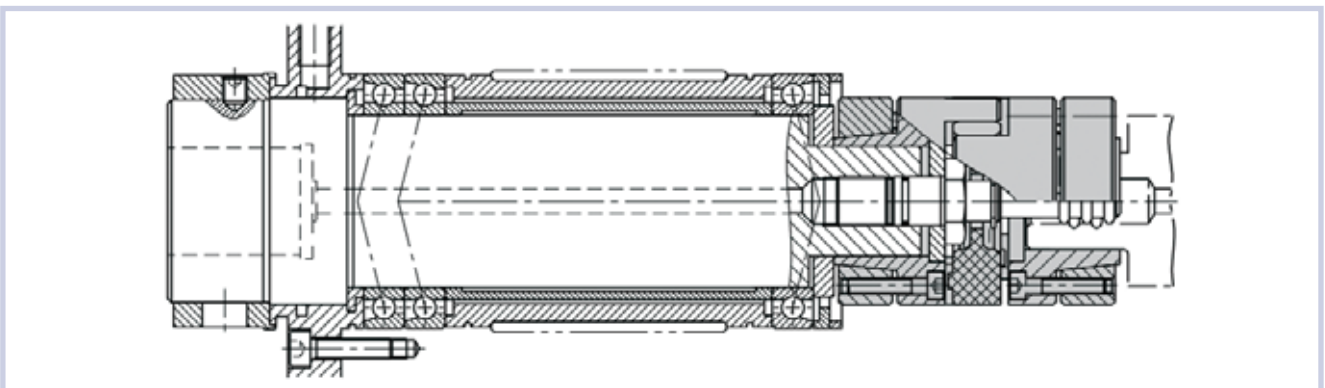
selected from the extensive coupling range in this catalogue.

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.

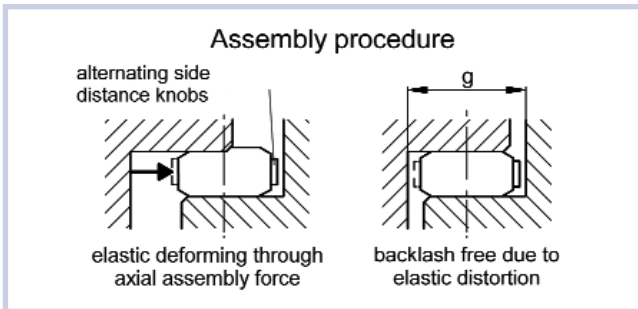
Low mass moments of inertia and high degree of balance ensure excellent dynamic characteristics. The coupling is prepared for an axial clamping of the spindle bearing, as well as for a central coolant feed through.

Elastomer couplings — Installation instructions

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 obliga-

tory 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, push-off 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 *28G6/shaft *28k6).



Admissible seat clearance shaft/hub:

Series ESM: max. 0,02 mm

Series EKM: min. 0,01mm/max. 0,04mm

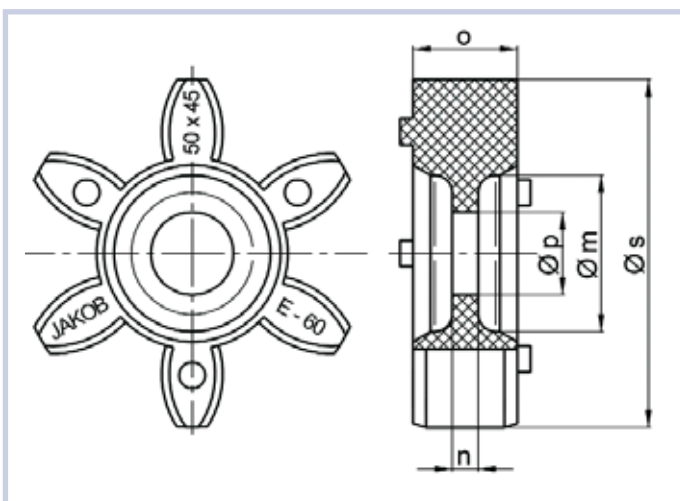
To ensure satisfactory function, the dimension "g" should be complied with as exactly as possible. The distance of the two shaft ends can certainly be smaller than "g" under consideration of the measurements "m" and "n".

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. 3xTN) 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 8).
- For smaller shaft diameters, the conical hub of ESM-couplings is additionally slitted.

Dimensions - Elastomerspider



| Sizes | Ø s | Ø m | 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 | 15 | 14,5 |
| 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 / red
- 72 Shore - D / 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. $\varnothing m_{-2mm}$ (upon request).