18 Technical appendix

Calculating the dimensions of the universal joints „G"

The selection of a universal joint ist not determined exclusively by the max. torque to be transmitted. There are also other operative conditions which must be taken into account, such as impact load, angular ratios, angular velocities, etc.
The diagrams presented below give approximate preliminary values for calculating the dimensions of the universal joints and contain the corresponding standard values.

Figure 1 shows the power and torque values transmitted by single precision universal joints during permanent operation with a deflection angle of $\alpha = 10°$.

Note: The loads to which double universal joints are exposed may only be about 90 % of the corresponding values for single universal joints. This also applies to shaft joints.

Figure 2 shows the adjustment value to be taken into consideration for greater deflection angles. For deflection angles less than 10°, e.g. between 0° to 5° you may increase the standard power value shown in figure 1 by 25%.

There are no general standard values for precision universal joints with friction bearings, for which it is possible to specify the service life, as the stress and strain to which the friction surfaces are exposed is determined by the regularity of the lubrication intervals.

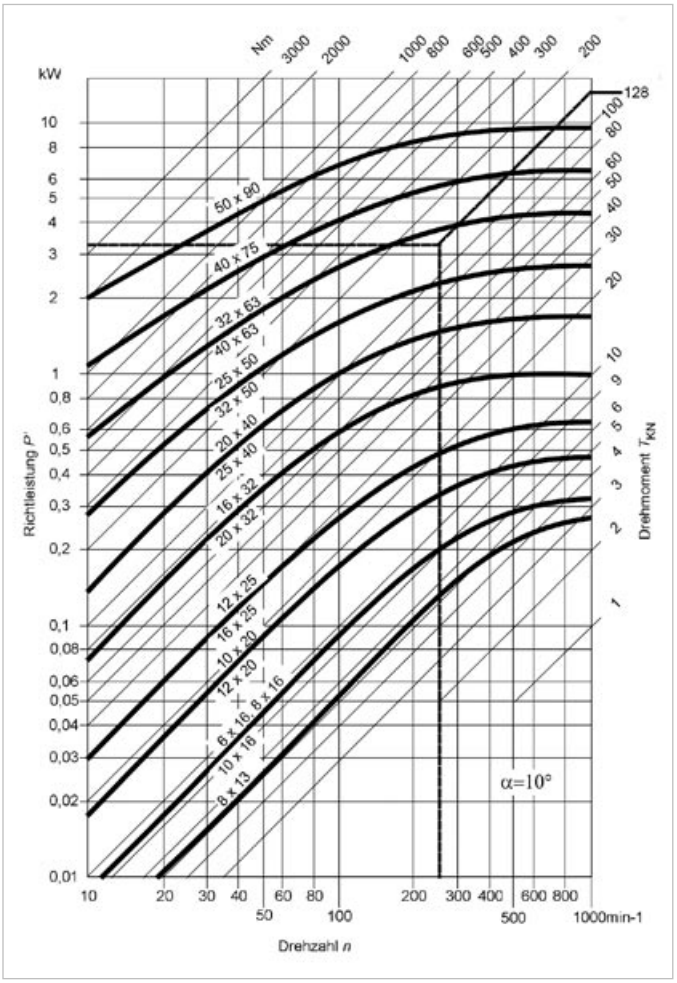

Fig. 1: Power diagram for precision universal joints with friction bearings in accordance with DIN 808-G

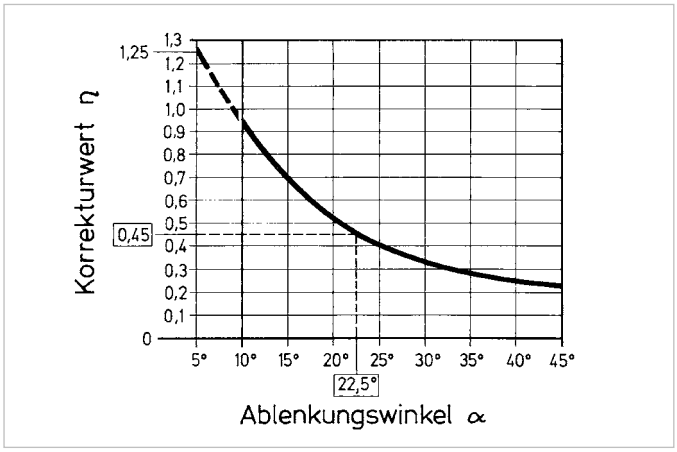

Fig. 2: Adjustment value in relation to the deflection angle

Example

Given values: the power to be transmitted P = 1,5 kW
speed n = 250 r.p.m.
deflection angle $\alpha = 22° 30'$
Calculation: adjustment value from fig. 2 n = 0,45

standard power $P' = \frac{P}{n} = \frac{1,5}{0,45} = 3,3$ kW

Figure 1 yields for n = 250 r.p.m. and 3,3 kW:
shaft joint E 32 x 63 (or E 40 x 63) with the admissible torque value of M = 125 Nm.

The universal joints are delivered without pinholes and clamping studs. The length of the clamping studs is determined by the outer diameter of the univseral joint; it must be flush when set.

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Calculating the dimensions of the universal joints „W”

Figure 5 shows the service life of BÜCO's maintenance-free precision universal joints with needle bearings depending on the impact factor (e.g. standard value 1.5 for an electromotor drive without flexible coupling), the adjustment value for the deflection angle and the torque value to be transmitted.

Figure 6 shows the adjustment value for calculating the service life of BÜCO's maintenance-free precision universal joints with needle bearings.

Note: The loads to which double universal joints are exposed may only be about 90% of the corresponding values for single universal joints. This also applies to shaft joints.

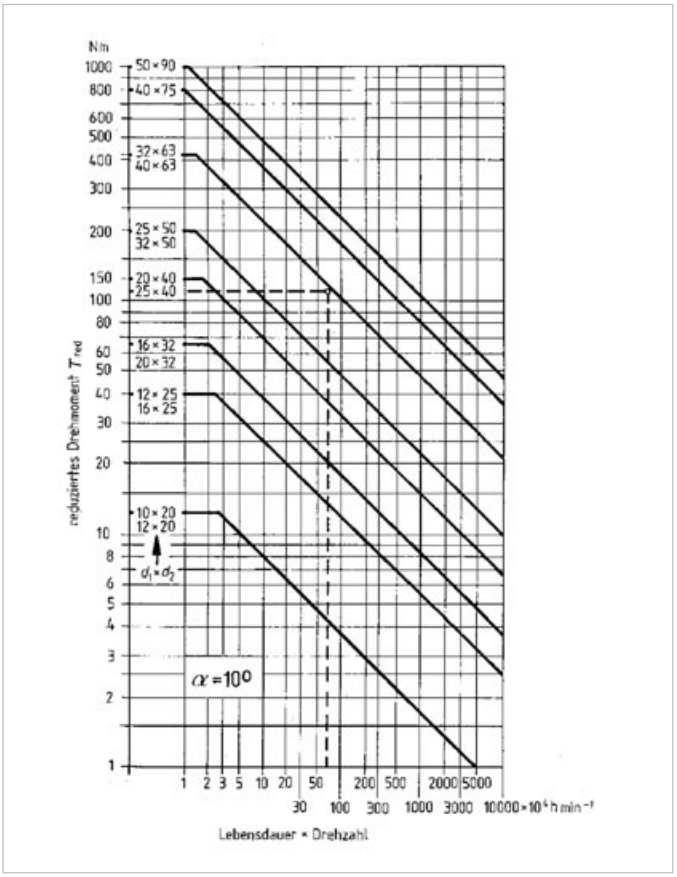

Fig. 5: Service life diagram for precision universal joints with needle bearings DIN 808-W

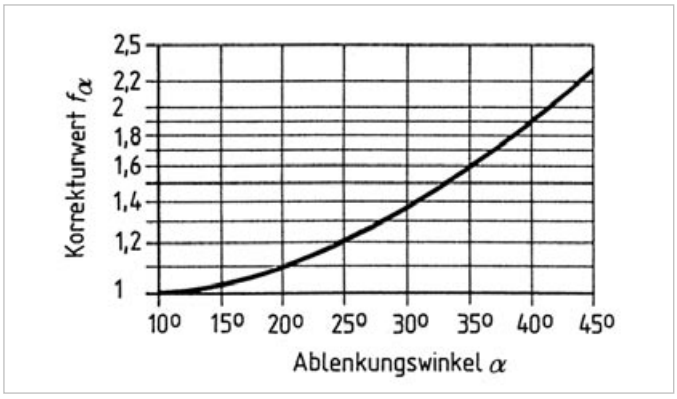

Fig. 6: Adjustment values with relation to the deflection angle

f_Z = impact factor (see technical questionnaire)
n = adjustment value (from figure 6)
M = torque value to be transmitted
$M_{red} = M \times f_Z \times n$

Example

Given values: the power to be transmitted M = 70 Nm
speed n = 1400 r.p.m.
service life L = 500 h
deflection angle $\alpha = 20°$
impact factor $f_Z = 1,5$
adjustment value from fig. 6 n = 1,1
reduced torque
$M_{red} = M \times f_Z \times n = 70 \times 1,5 \times 1,1 = 116$
$L \times n = 500 \times 1400 = 700\,000 = 70 \times 10^4$

Figure 5 yields: universal joint E 32 x 63.

The universal joints are delivered without pinholes and clamping studs. The length of the clamping studs is determined by the outer diameter of the univseral joint; it must be flush when set.

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Calculating the dimensions of the universal joints „bracket version”

Figure 3 shows the power and torque values transmitted by single precision universal joints (bracket version) during permanent operation and with a deflection angle of $\alpha = 10°$.

Figure 4 shows the adjustment value to be taken into consideration for greater deflection angles. For deflection angles between 0° to 5° you may increase the standard power value by 25%.

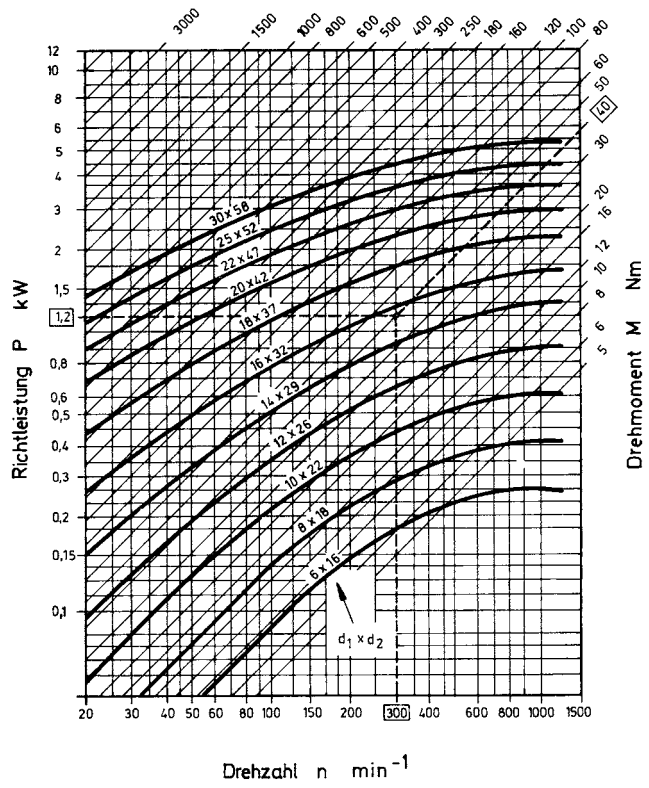

Fig. 3: Power diagram for precision bracket joints with friction bearings

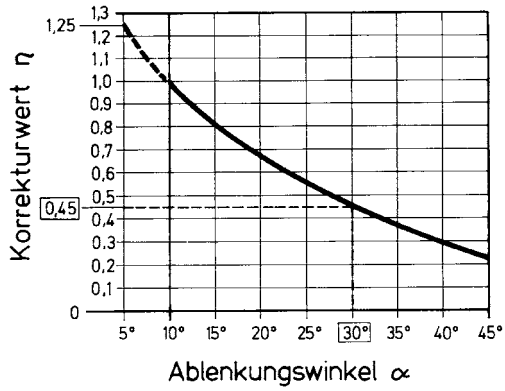

Fig. 4: Adjustment values with relation to the deflection angle

Example

Given values: the power to be transmitted P = 0,540 kW
speed n = 300 r.p.m.
deflection angle $\alpha = 30°$

Calculation: adjustment value from fig. 4 n = 0,45

standard power $P' = \frac{P}{n} = \frac{0{,}540}{0{,}45} = 1{,}2$ kW

Figure 3 yields for n = 300 r.p.m. and 1,2 kW a universal joint E 16 x 32 with the admissible torque value of M = 40 Nm.

The universal joints are delivered without pinholes and clamping studs. The length of the clamping studs is determined by the outer diameter of the univseral joint; it must be flush when set.