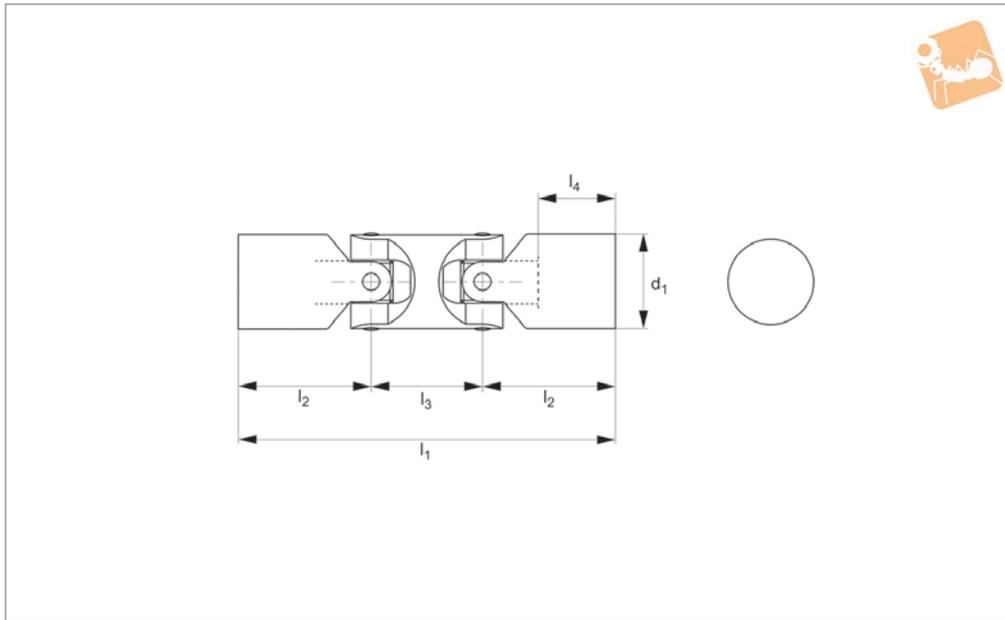


# Double Universal Joint

unbored - solid ends

## Universal Joints



**R3683**

UNIVERSAL JOINTS

### Material

Steel (9SMnPb28k, no. 10718).  
Bearing type: Plain bearing.

Maximum bending angle 45° per joint.  
Max. drive speed of 1000 rpm.

two shafts offset in relation to each other.  
Product variations available on request:  
square bores and hex bores.

### Technical Notes

To DIN 808.

### Tips

Double universal joints are used where  
large bending angles are required or where

Order No.	Bore dia.	d <sub>1</sub>	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>4</sub>	Weight g
R3683.013	Unbored	13	61	21	19	14	50
R3683.017	Unbored	17	63	20	23	12	80
R3683.018	Unbored	17	75	26	23	18	80
R3683.020	Unbored	20	89	31	27	21	150
R3683.025	Unbored	25	87	28	31	16	250
R3683.026	Unbored	25	105	37	31	25	350
R3683.032	Unbored	32	125	43	39	26	450
R3683.040	Unbored	40	155	54	47	34	1000
R3683.050	Unbored	50	189	66	57	42	2000
R3683.060	Unbored	60	237	83	71	53	3000

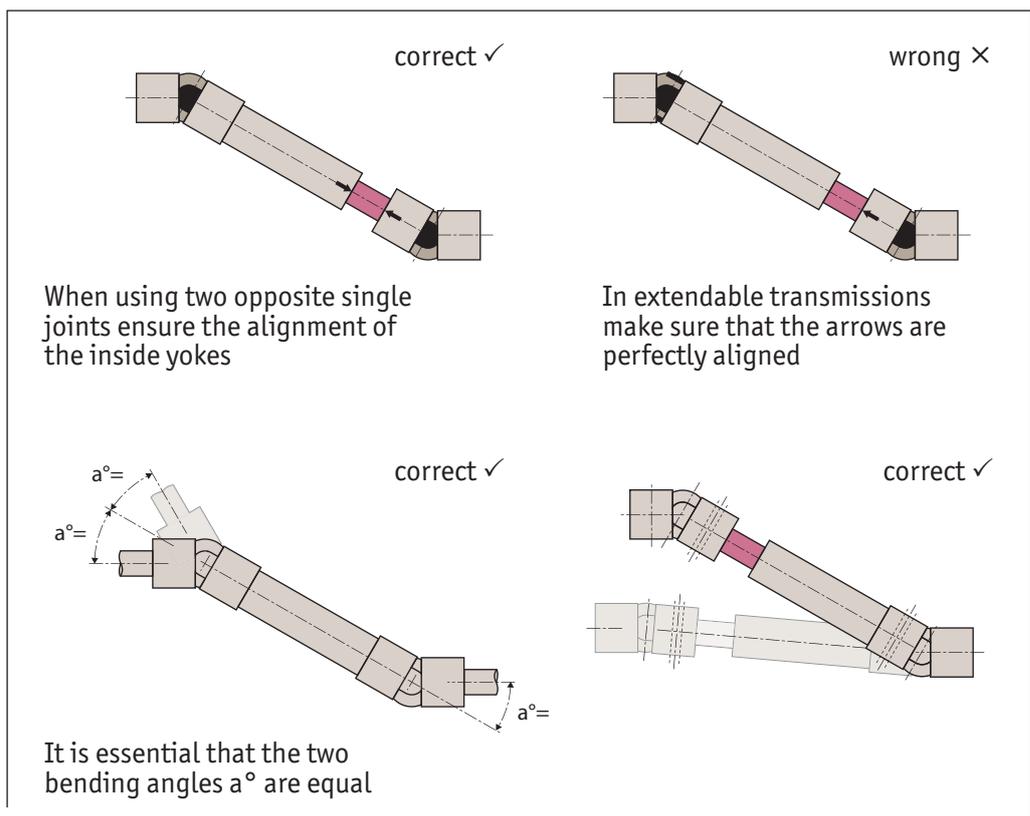
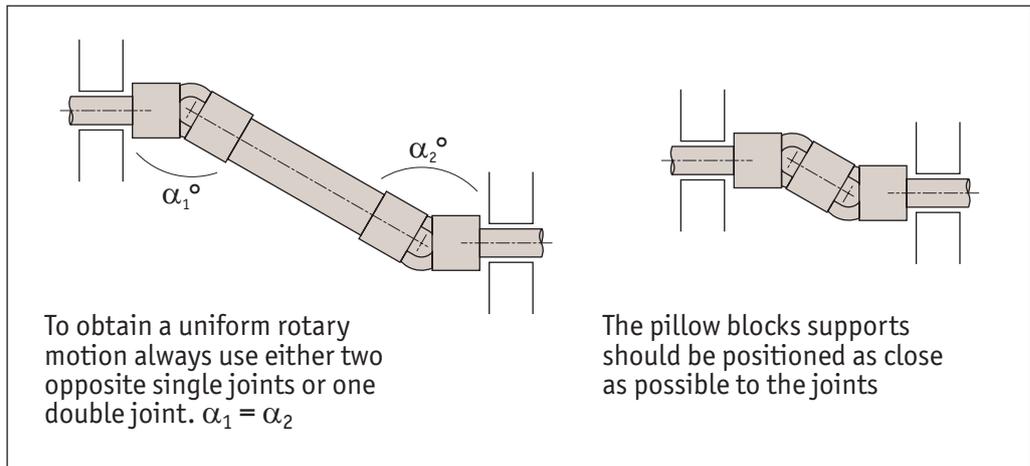


When one single joint is coupled with two shafts (of which the driving one is rotating at a constant speed) forming an angle, a periodic variation of the driven shaft is caused with exactly four fluctuations per revolution.

The difference between the maximum and the minimum speed of the driven shaft depends on the angle formed by the two shafts. The difference grows with the increase of the angle  $a^\circ$ . To have a smooth transmission, either two opposite single joints (ensuring that the two central yokes lie on the same plane and the angles are equal) or a double joint need to be fitted. The irregularity caused by the articulation of the first unisex joint is cancelled by the second unisex joint. The overall length resulting from the coupling of the two single joints can be reduced by using a double unisex joint. In other words, the double joint is to be considered as the shortest method of achieving smooth transmission.

For low speed applications (max. 1000 rpm), joints with plain bearings are recommended. They are able to support shock loads, motion reversal, irregular running and relatively high torques. The working angles must be restricted when using at speeds between 500 - 1000 rpm. Please consult our technical department if you have such an application.

For high rotation speeds, relatively low torques or wide angles, joints with needle roller bearings are preferred. They can reach 4000 rpm dependent on the angle.





### How to read diagrams

The joints capacity to transmit a regular torque at a constant load with no shocks, for a long period, mainly depends on the number of revolutions per minute and the inclination angle  $a^\circ$  of the two axes. The diagrams on the following pages are based on this. Each curve corresponds to the joint size (outside diameter "D") and represents the torque that the joint can transmit depending on speed and working angle  $a^\circ$ .

The diagrams can be directly read if angle ( $a^\circ$ ) is  $10^\circ$ . For wider angles, torques are reduced, these should be corrected using the correction vales (F) relating to the angle shown in the table.

### IMPORTANT

Graph values are merely indicative and refer to the single joints only. When choosing a double joint, you have to consider that they can transmit a torque about 10% lower than the same sized single joints. Each application has its own particular motion characteristics, such as: shock loads, motion reversals, connected masses, kind of starting, presence of elastic joints, stops and starts, etc., that have to be considered when choosing the joint.

Working angle $a^\circ$	Correction value F
$5^\circ$	1,25
$10^\circ$	1,00
$15^\circ$	0,80
$20^\circ$	0,65
$25^\circ$	0,55
$30^\circ$	0,45
$35^\circ$	0,38
$40^\circ$	0,30
$45^\circ$	0,25

### Torque Calculation for Plain Bearings

Power: 0,65 KW, RPM: 230

With working angle  $10^\circ$  Value  $F = 1$  we get point P. Torque = 27 Nm corresponding to joint size "D" = 25/26mm. = Types R3688.016 and R3689.012

With working angle  $30^\circ$  Value  $F = 0.45$  (Kw 0,65: 0,45 = 1,44Kw) we get point P1 Torque = 60 Nm corresponding to joint size "D" = 32mm. = Types R3688.020 and R3689.016

Consider that:

$$\text{Torque in Nm} = 9550 \times \frac{\text{Power (KW)}}{\text{RPM}}$$

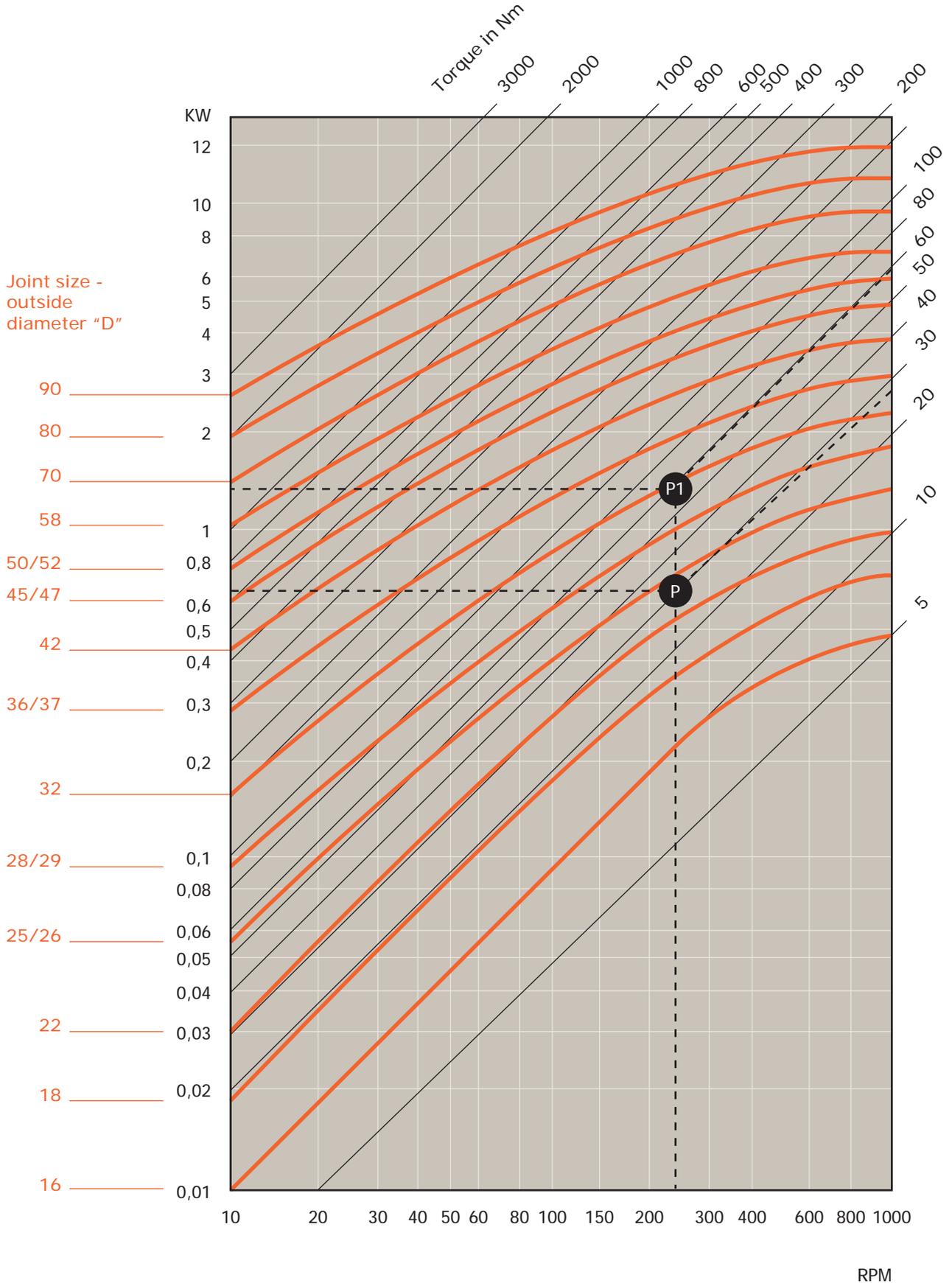
$$\text{Torque in Nm} = 7020 \times \frac{\text{Power (HP)}}{\text{RPM}}$$

Note: 1 KW = 1,35 HP and HP = 0,736 KW

Note: 1 Kgm = 9,81 Nm and Nm = 0,102 Kgm



#### Plain Bearings Single & Double



\*For double reduce Torque by 15%



Working angle a °	Correction value F
5°	1,25
10°	1,00
15°	0,90
20°	0,80
25°	0,70
30°	0,50
35°	0,40
40°	0,30
45°	0,25

### Torque Calculation

Power: 0,55 KW, RPM: 2300

With working angle a 10° Value F = 1 we get point P. Torque = 23 Nm corresponding to joint size "D" = 28mm. = Type R3686.014

With working angle a 25° Value F = 0.70 (Kw 5,5: 0,70 = 7,85Kw) we get point P1 Torque = 33 Nm corresponding to joint size "D" = 32mm. = Type R3686.016

Consider that:

$$\text{Torque in Nm} = 9550 \times \frac{\text{Power (KW)}}{\text{RPM}}$$

$$\text{Torque in Nm} = 7020 \times \frac{\text{Power (HP)}}{\text{RPM}}$$

Note: 1 KW = 1,35 HP and HP = 0,736 KW

Note: 1 Kgm = 9,81 Nm and 1Nm = 0,102 Kgm

Factor in a safety factor for shock load, recipricating methods, start up shocks etc.

Universal Joints from Automation Components

UNIVERSAL JOINTS