

R3681

UNIVERSAL JOINTS

Material

Stainless steel (AISI 304), bearing type: plain bearing.

Technical Notes

To DIN 808, maximum bending angle 45°

per joint.

The drive speed of universal joints with journal bearings must not exceed 1000 rpm.

Tips

Double universal joints are used where large bending angles are required or where two shafts offset in relation to each other. Zinc plated available on request.

Order No.	d ₁ tol. h7	d ₂	d ₃	l ₁ min.	l ₁ max.	l ₂	l ₃ stroke	l ₄	w ₁ tol. JS9	w ₂	Shaft	Weight g
R3681.10-140-170	10	20	20	140	170	48	30	12	3	11.4	11x14x6	310
R3681.10-160-200	10	20	20	160	200	48	40	12	3	11.4	11x14x6	360
R3681.10-180-240	10	20	20	180	240	45	60	12	3	11.4	11x14x6	380
R3681.10-230-330	10	20	20	230	330	48	100	12	3	11.4	11x14x6	500
R3681.12-160-190	12	23	23	195	265	50	70	14	4	13.8	13x16x6	500
R3681.12-180-225	12	23	23	180	225	56	45	13	4	13.8	13x16x6	560
R3681.12-200-270	12	23	23	200	270	56	70	13	4	13.8	13x16x6	620
R3681.12-220-300	12	23	23	220	300	56	80	13	4	13.8	13x16x6	670
R3681.12-250-355	12	23	23	250	355	56	105	13	4	13.8	13x16x6	760
R3681.12-280-420	12	23	23	280	420	56	140	13	4	13.8	13x16x6	840
R3681.14-170-200	14	25	25	170	200	60	30	14	5	16.3	13x16x6	620
R3681.14-180-220	14	25	25	180	220	60	40	14	5	16.3	13x16x6	640
R3681.14-200-260	14	25	25	200	260	60	60	14	5	16.3	13x16x6	720
R3681.14-220-300	14	25	25	220	300	60	80	14	5	16.3	13x16x6	780
R3681.14-250-350	14	25	25	250	350	60	100	14	5	16.3	13x16x6	870
R3681.14-280-420	14	25	25	280	420	60	140	14	5	16.3	13x16x6	960
R3681.14-300-450	14	25	25	300	450	60	150	14	5	16.3	13x16x6	1030
R3681.14-350-550	14	25	25	350	550	60	200	14	5	16.3	13x16x6	1170
R3681.14-400-650	14	25	25	400	650	60	250	14	5	16.3	13x16x6	1330
R3681.16-190-220	16	29	29	190	220	68	30	16	5	18.3	16x20x6	900
R3681.16-210-250	16	29	29	210	250	68	40	16	5	18.3	16x20x6	980
R3681.16-240-320	16	29	29	240	320	68	80	16	5	18.3	16x20x6	1100
R3681.16-250-350	16	29	29	250	350	68	100	16	5	18.3	16x20x6	1140
R3681.16-275-390	16	29	29	275	390	68	115	16	5	18.3	16x20x6	1240
R3681.16-300-430	16	29	29	300	430	68	130	16	5	18.3	16x20x6	1330
R3681.16-380-590	16	29	29	380	590	68	210	16	5	18.3	16x20x6	1600
R3681.16-400-630	16	29	29	400	630	68	230	16	5	18.3	16x20x6	1730
R3681.18-230-280	18	32	32	230	280	74	50	17	6	20.8	18x22x6	1350
R3681.18-250-320	18	32	32	250	320	74	70	17	6	20.8	18x22x6	1460
R3681.18-270-370	18	32	32	270	370	74	100	17	6	20.8	18x22x6	1550
R3681.18-290-400	18	32	32	290	400	74	110	17	6	20.8	18x22x6	1660
R3681.18-300-415	18	32	32	300	415	74	115	17	6	20.8	18x22x6	1710



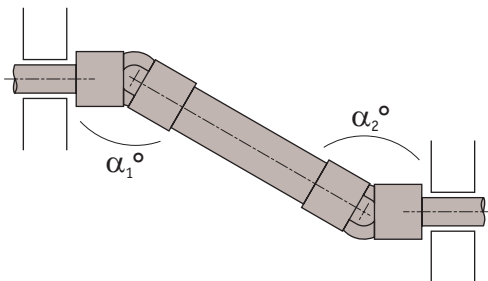
Order No.	d ₁ tol. h7	d ₂	d ₃	l ₁ min.	l ₁ max.	l ₂	l ₃ stroke	l ₄	w ₁ tol. JS9	w ₂	Shaft	Weight g
R3681.18-400-620	18	32	32	400	620	74	220	17	6	20.8	18x22x6	2230
R3681.18-500-820	18	32	32	500	820	74	320	17	6	20.8	18x22x6	2750
R3681.20-250-300	20	35	32	250	300	82	50	18	6	22.8	21x25x6	1990
R3681.20-270-340	20	35	32	270	340	82	70	18	6	22.8	21x25x6	2120
R3681.20-290-380	20	35	32	290	380	82	90	18	6	22.8	21x25x6	2250
R3681.20-320-440	20	35	32	320	440	82	120	18	6	22.8	21x25x6	2460
R3681.20-380-560	20	35	32	380	560	82	180	18	6	22.8	21x25x6	2860
R3681.20-420-640	20	35	32	420	640	82	220	18	6	22.8	21x25x6	3130
R3681.20-500-800	20	35	32	500	800	82	300	18	6	22.8	21x25x6	3660
R3681.22-250-280	22	40	35	250	280	95	30	22	6	24.8	23x28x6	2350
R3681.22-270-320	22	40	35	270	320	95	50	22	6	24.8	23x28x6	2510
R3681.22-290-350	22	40	35	290	350	95	60	22	6	24.8	23x28x6	2670
R3681.22-330-430	22	40	35	330	430	95	100	22	6	24.8	23x28x6	3000
R3681.22-350-470	22	40	35	350	470	95	120	22	6	24.8	23x28x6	3160
R3681.22-470-710	22	40	35	470	710	95	240	22	6	24.8	23x28x6	4130
R3681.25-295-345	25	45	40	295	345	108	50	26	8	28.3	26x32x6	3390
R3681.25-310-375	25	45	40	310	375	108	65	26	8	28.3	26x32x6	3520
R3681.25-350-450	25	45	40	350	450	108	100	26	8	28.3	26x32x6	3920
R3681.25-380-500	25	45	40	380	500	108	120	26	8	28.3	26x32x6	4200
R3681.25-420-590	25	45	40	420	590	108	170	26	8	28.3	26x32x6	4590
R3681.25-460-660	25	45	40	460	660	108	200	26	8	28.3	26x32x6	4980
R3681.25-500-745	25	45	40	500	745	108	245	26	8	28.3	26x32x6	5370
R3681.30-330-380	30	50	45	330	380	122	50	29	8	33.3	32x38x8	4900
R3681.30-350-420	30	50	45	350	420	122	70	29	8	33.3	32x38x8	5170
R3681.30-370-455	30	50	45	370	455	122	85	29	8	33.3	32x38x8	5420
R3681.30-400-510	30	50	45	400	510	122	110	29	8	33.3	32x38x8	5850
R3681.30-450-620	30	50	45	450	620	122	170	29	8	33.3	32x38x8	6480
R3681.30-500-720	30	50	45	500	720	122	220	29	8	33.3	32x38x8	7140
R3681.30-540-795	30	50	45	540	795	122	255	29	8	33.3	32x38x8	7690

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.

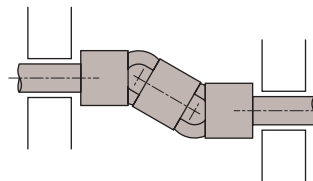
The difference between the maximum and the minimum speed of the driven shaft depends on the angle formed by the two shafts. The difference grows with the increase of the angle α° . To have a smooth transmission, either two opposite single joints (ensuring that the two central yokes lie on the same plane 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.

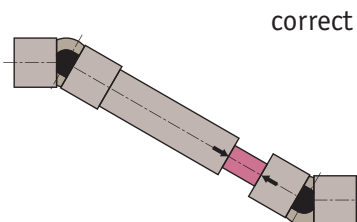
For high rotation speeds, relatively low torques or wide angles, joints with needle roller bearings are preferred. They can reach 4000 rpm dependent on the angle.



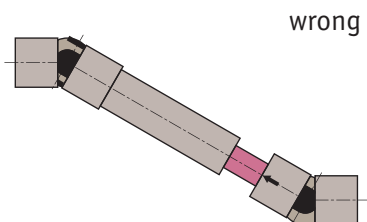
To obtain a uniform rotary motion always use either two opposite single joints or one double joint. $\alpha_1 = \alpha_2$



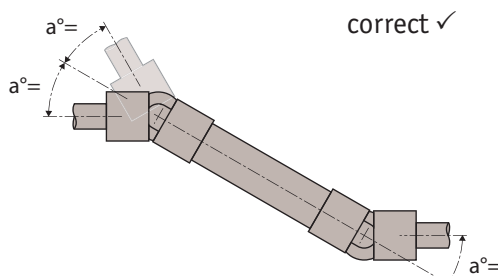
The pillow blocks supports should be positioned as close as possible to the joints



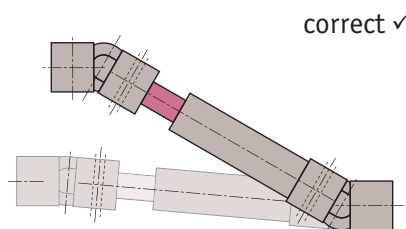
When using two opposite single joints ensure the alignment of the inside yokes



In extendable transmissions make sure that the arrows are perfectly aligned



It is essential that the two bending angles α° are equal





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 α° 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 α° .

The diagrams can be directly read if angle (α°) is 10° . 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 α°	Correction value F
5°	1,25
10°	1,00
15°	0,80
20°	0,65
25°	0,55
30°	0,45
35°	0,38
40°	0,30
45°	0,25

Torque Calculation for Plain Bearings

Power: 0,65 KW, RPM: 230

With working angle a 10° 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 a 30° 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

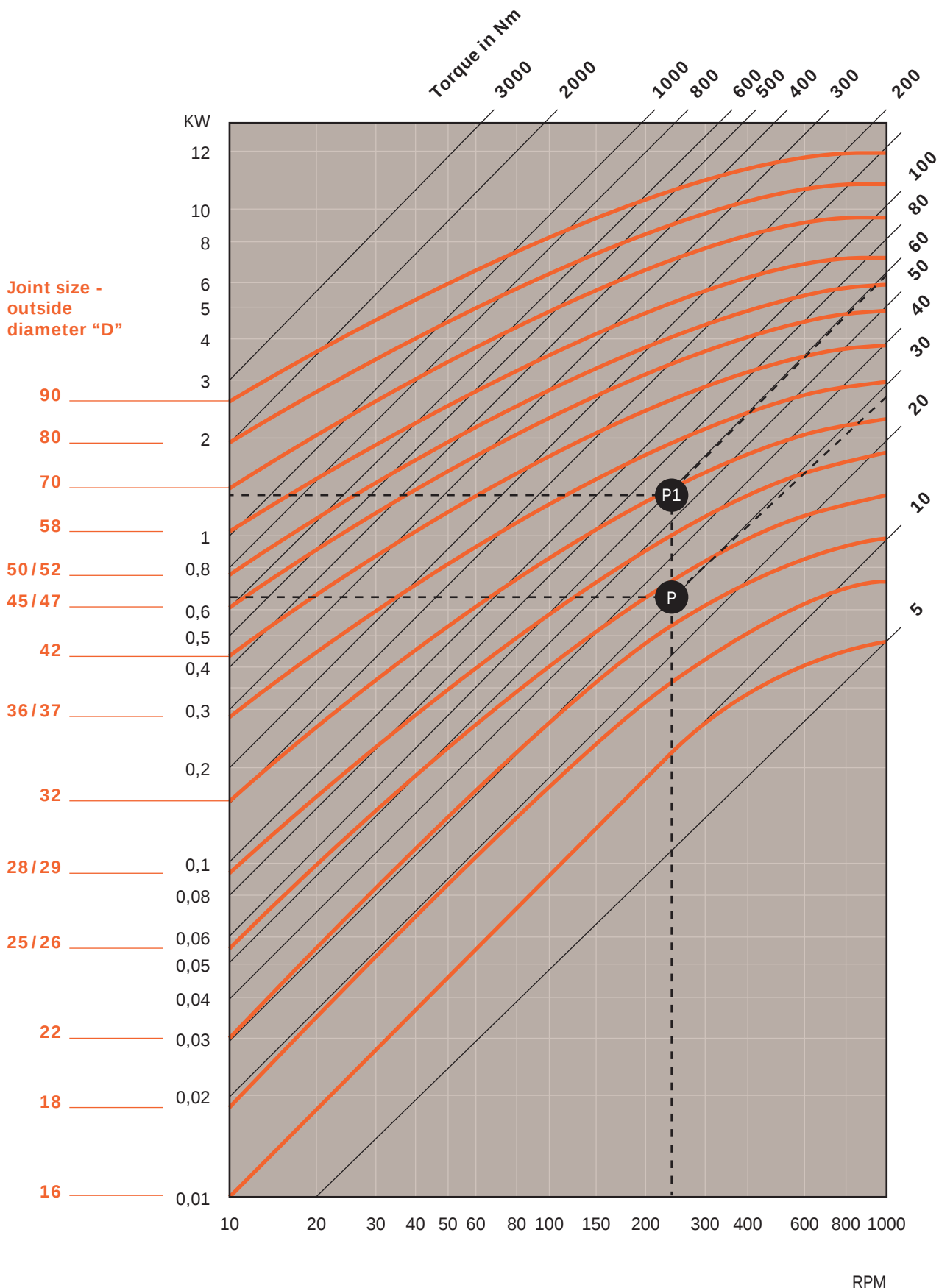


Technical Information

Torque Ratings for Plain Bearing Universal Joints

Universal
Joints

Plain Bearings Single & Double



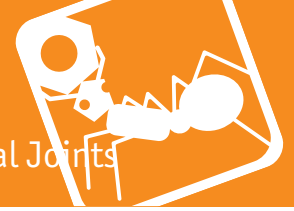
*For double reduce Torque by 15%



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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.