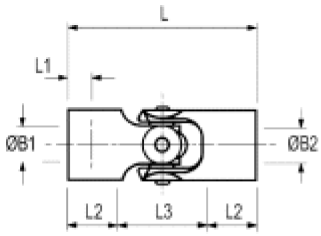
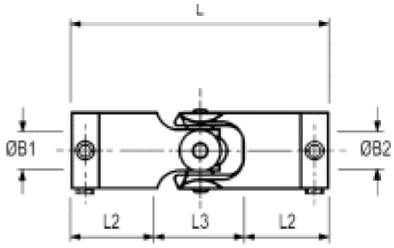
HUCO-POL PLASTICS UNIVERSAL JOINTS, BRASS CROSS PIECES

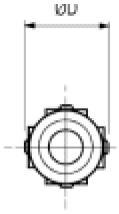
Single joints



Ref. 101
Plain moulded bores.
Attach shafts by cross-pinning

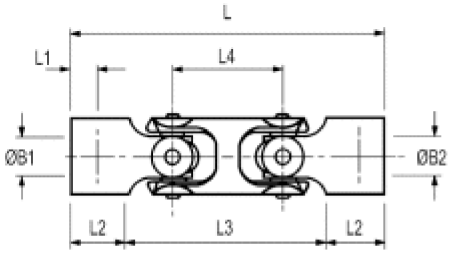


Ref. 103
Headed brass inserts fitted 2 screws per end (size 6, one screw)

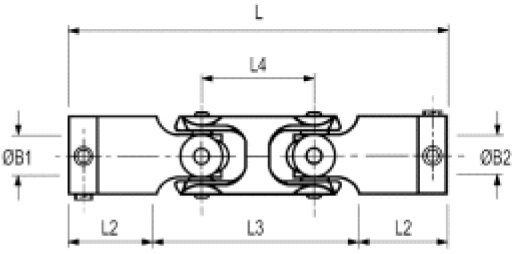


Typical

Double joints



Ref. 109
Plain moulded bores.
Attach shafts by cross-pinning

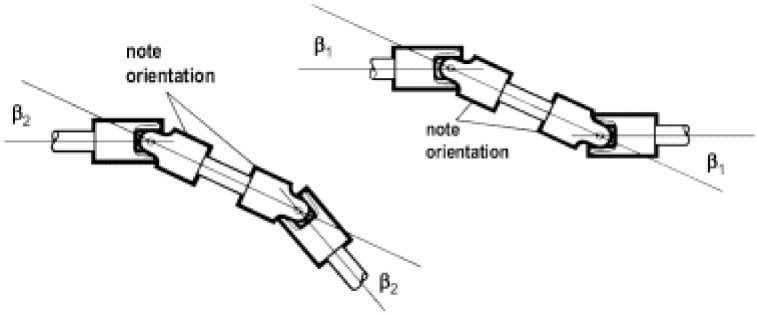


Ref. 111
Headed brass inserts fitted 2 screws per end (size 6, one screw)

Constant velocity

The velocity ratio of single universal joints is not constant when the working angle is greater than zero. Their geometry gives rise to sinusoidal fluctuations at the output that increase with the working angle and which vary between:

$\omega\cos\beta$ and $\omega \sec\beta$
where ω = angular velocity
and β = operating angle
For example, when the operating angle is 5°, the maximum error is ±0.4%; at 7° it is ±0.8%, and at 10° it is ±1.5%. A motor shaft turning at a constant 1000 rpm, driving through a single universal joint set at an operating angle of 5°, produces an output that fluctuates between 996 rpm and 1004 rpm twice each revolution.
The fluctuations are cancelled out when using a double joint or two single joints connected back to back.



To maintain constant velocity ratio, ensure that:
a) The orientation of two single joints is correct; the inboard forks should align as in double joints.
b) The working angle of both joints, or both halves of a double joint, is the same.

HOW TO ORDER

Combine the joint ref in Main Table
with BORE REFS in Standard Bores Table.
Please identify both bores e.g.

103.06.1416

Coupler ref.
Ø B1 ref.
Ø B2 ref.

MAIN TABLE - DIMENSIONS & ORDER CODES

Size	Joint Single	Joint Double	0D	L	L1	L2	L3	L4	0B1, 0B2 max	Fasteners Screw	Fasteners ²Torque Nm	Wrench mm	Moment of inertia kgm² x 10-8	Mass kg x 10-³
	JOINT FREE													
06	101.06	-	7.1	19.1	3.3	5.3	8.6	-	4.76	-	-	-	0.3	0.7
	103.06	-		27.2	-	9.3			3.18	M3	0.94	1.5	1.1	3.1
	-	109.06		27.2	3.3	5.3	16.7	8.1	4.76	-	-	-	0.6	1.1
	-	111.06		35.3	-	9.3			3.18	M3	0.94	1.5	1.3	3.5
09	101.09	-	11.1	28.5	4.3	8.6	11.4	-	6.35	-	-	-	4.0	2.7
	103.09	-		37.6	-	13.1			5	M	0.94	1.5	13.5	9.3
	-	109.09		41.7	4.3	8.6	24.6	13.2	6.35	-	-	-	5.9	4.5
	-	111.09		50.8	-	13.1			5	M3	0.94	1.5	15.3	11.1
13	101.13	-	14.3	35.6	5.6	10.4	14.8	-	8	-	-	-	14.3	5.7
	103.13	-		46.2	-	15.7			6.35	M3	0.94	1.5	44.6	17.7
	-	109.13		51.4	5.6	10.4	30.7	15.9	8	-	-	-	23.7	9.6
	-	111.13		62.1	-	15.7			6.35	M3	0.94	1.5	50.4	21.6
16	101.16	-	17.5	53.3	8.9	15.2	23.0	-	11	-	-	-	32.3	12.2
	103.16	-		67.6	-	22.3			10	M4	2.27	2.0	136.0	35
	-	109.16		75.5	8.9	15.2	45.2	22.2	11	-	-	-	63.5	19.7
	-	111.16		89.8	-	22.3			10	M4	2.27	2.0	178.0	

Materials & Finishes

Forked body members:
Acetal (black)
Cross pieces & headed bore inserts:
Brass BS2874 CZ121
Chromate & passivate finish
Fasteners:
Alloy steel, black oiled
Temperature Range
–20°C to +60°c

PERFORMANCE (AT 20°C)

Joint Size	Signle / Double	Peak torque Nm	Max compensation Angular ± deg	Max compensation Radial ± mm	Torsional Rate deg / Nm	Torsional Stiffness Nm / rad	Max end loading N	Static break torque NM
06	Single	0.11	45	-	19.7	2.9	18	0.45
	Double	0.08	90	5.6	81.9	0.7	0	0.34
09	Single	0.36	45	-	6.8	8.4	38	1.9
	Double	0.16	90	9.1	13.3	4.3	0	1.9

13	Single	0.85	45	-	3.2	18.0	67	4.5
	Double	0.59	90	10.9	8.1	7.1	0	3.4
16	Single	1.6	45	-	1.7	34.0	98	6.8
	Double	1.3	90	15.5	4.5	12.6	0	6.8

1. Recommended datum for cross-pinning/screws, etc.
2. Max shaft penetration 3. Maximum recommended tightening torque.
4. Values apply with max bores.
5. **Peak torque**. Select a size where Peak Torque exceeds the adjusted torque.
6. Torsional stiffness values apply at 50% peak torque with no misalignment, measured shaft-to-shaft with largest standard bores.
7. With joints cross-pinned to shafts.
8. Couplers can be specified with 'D' bores. See page 4 for details.

ADJUSTED TORQUE

Peak torque values apply when the working angle is zero. Adjusted torque takes account of dynamic loading at the bearings. To find adjusted torque, determine application speed, torque and operating angle,

Then:

a) multiply speed x working angle
b) subtract the result from 10000
c) divide the answer into 10000
d) apply the result to the application torque.

eg. speed = 400 rpm
application torque = 0.1Nm
working angle = 20°

Accordingly:

a) 400 rpm x 20° = 8000
b) 10000 – 8000 = 2000
c) 10000 / 2000 = 5
d) 5 x 0.1Nm = 0.5Nm

Select a joint where Peak Torque exceeds 0.5Nm, ie., size 13 or larger.

Note: To remain within the capacity of the joint, the result of speed x working angle must be less than 10000.

STANDARD BORES

Joint Size	Ref	0B1, 0B2. Tolerances Refs. 101 & 109+0.04/-0.01mm, Refs. 103 & 111 +0.03/-0mm									
		3	3.175	4	4.763	5	6	6.350	8	9.525	10
06	101 & 109	●	●	●	●						
	101 & 111	○	○								
09	101 & 109			●	●	●	●	●			
	101 & 111	○	○	○	○	○					
13	101 & 109						●	●	●		
	101 & 111			○	○	○	○	○			
16	101 & 109								●	●	●
	101 & 111						○	○	○	○	○
Bore ref.		14	16	18	19	20	22	24	28	31	32
Corresponding bore adaptor											

● moulted bores ○ sleeved bores

Diameters for which a bore adaptor is shown can be adapted to smaller shaft sizes.

Larger Sizes

MAIN TABLE - DIMENSIONS & ORDER CODES

Joint size	Single JOINT REF.	0D	L	L1	L2	L3	0B1, 0B2 max	Moment of inertia kgm² x 10-8	Mass kg x 10-³
20	105.20	23.0	62.0	8.0	17.20	28.0	12.70	147	25.7
25	105.25	28.5	74.0	10.0	20.0	34.0	14	463	56
32	105.32	36.5	86.0	10.0	21.0	44.0	20	1339	103

Materials & Finishes

Forked body members:
Acetal (black)
Cross pieces:
Brass BS 2874 CZ122
Chromate & passivate finish
Bore sleeves:
Al. Alloy 2011T3 or T8
Temperature Range
–20°C to +60°c

PERFORMANCE (AT 20°C)

Joint size	Peak torque Nm	Max compensation Angular ± deg	Max compensation Radial ± mm	Torsional Rate deg / Nm	Torsional Stiffness Nm / rad	Max end loading N	Static break torque Nm
20	2.8			0.94	61	138	17
25	5.6	40	-	0.51	112	222	34
32	10.7			0.25	229	334	72

1. Recommended datum for cross-pinning/screws, etc.
2. Max shaft penetration
3. Values apply with max bores.
4. Peak torque. Select a size where Peak Torque exceeds the adjusted torque.
5. Torsional stiffness values apply at 50% peak torque with no misalignment, measured shaft-to-shaft with largest standard bores.
6. With joints cross-pinned to shafts.
7. Couplers can be specified with ‘D’ bores. See page 4 for details.

ADJUSTED TORQUE

Peak torque values apply when the working angle is zero. Adjusted torque takes account of dynamic loading at the bearings. To find adjusted torque, determine application speed, torque and operating angle,

Then:
a) multiply speed x working angle
b) subtract the result from 10000
c) divide the answer into 10000
d) apply the result to the application torque.

eg. speed = 400 rpm
application torque = 1Nm
working angle = 20°

Accordingly:
a) 400 rpm x 20° = 8000
b) 10000 – 8000 = 2000
c) 10000 / 2000 = 5
d) 5 x 1Nm = 5Nm

Select a joint where Peak Torque exceeds 5Nm, ie., size 25 or larger.

Note: To remain within the capacity of the joint, the result of speed x working angle must be less than 10000.

STANDARD BORES

0B1, 0B2 +0.03 / -0MM

Joint Size	9.525	10	12	12.700	14	15.875	16	18	19	19.050	20
20	O	O	O	O							
25			O	O	O						
32						O	O	O	O	O	O
Bore ref.	31	32	35	36	38	41	42	45	46	47	48
Corresponding bore adaptor		257		259			260				261

● moulted bores ○ sleeved bores

Diameters for which a bore adaptor is shown can be adapted to smaller shaft sizes.

HOW TO ORDER

Combine the joint ref in Main Table
with BORE REFS in Standard Bores Table.
Please identify both bores e.g.

105.20.3135

Coupler ref.
Ø B1 ref.
Ø B2 ref.