

RS 688-947, -975, -007, -035

HUCO-POL PLASTICS UNIVERSAL JOINTS, BRASS CROSS PIECES

MAIN TABLE - DIMENSIONS & ORDER CODES

Size	Joint		ØD	L	L1 ¹	L2 ²	L3	L4	ØB1, ØB2 max	Fasteners			Moment of inertia kgm ² x 10 ⁻⁸	Mass kg x 10 ⁻³
	Single	Double								Screw	Torque ³ Nm	Wrench mm		
JOINT REF														
688-947 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
688-975 09	-	111.06	11.1	35.3	-	9.3	11.4	-	3.18	M3	0.94	1.5	1.3	3.5
	101.09	-		28.5	4.3	8.6			6.35	-	-	-	4.0	2.7
	103.09	-		37.6	-	13.1	5	M3	0.94	1.5	13.5	9.3		
689-007 13	-	109.09	14.3	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
	101.13	-		35.6	5.6	10.4	14.8	-	8	-	-	-	14.3	5.7
689-035 16	103.13	-	17.5	46.2	-	15.7	30.7	15.9	6.35	M3	0.94	1.5	44.6	17.7
	-	109.13		51.4	5.6	10.4			8	-	-	-	23.7	9.6
	-	111.13		62.1	-	15.7	6.35	M3	0.94	1.5	50.4	21.6		
	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	11	-	-	-	63.5	19.7		
	-	111.16	89.8	-	22.3	45.2	22.2	10	M4	2.27	2.0	178.0	42.4	

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	Single / Double	Peak torque ⁵ Nm	Max compensation ⁶		Torsional ⁷		Max end loading N	Static break torque Nm
			Angular ± deg	Radial ± mm	Rate deg / Nm	Stiffness Nm / rad		
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

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

STANDARD BORES⁸

Size	Joint Ref.	ØB1, ØB2. 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	●	●	●	●						
	103 & 111	○	○								
09	101 & 109			●	●	●	●				
	103 & 111	○	○	○	○						
13	101 & 109						●	●	●		
	103 & 111			○	○	○	○	○			
16	101 & 109								●	●	●
	103 & 111						○	○	○	○	○
	Bore ref.	14	16	18	19	20	22	24	28	31	32
	Corresponding bore adaptor					251		253	255		257

- moulded bores
- sleeved bores

Diameters for which a bore adaptor is shown can be adapted to smaller shaft sizes. See page 32 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:

- multiply speed x working angle
- subtract the result from 10000
- divide the answer into 10000
- apply the result to the application torque.

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

Accordingly:

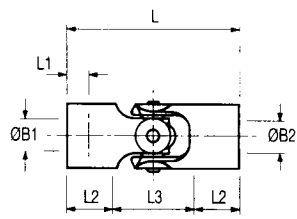
- 400 rpm x 20° = 8000
- 10000 - 8000 = 2000
- 10000 / 2000 = 5
- 5 x 0.1Nm = 0.5Nm

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

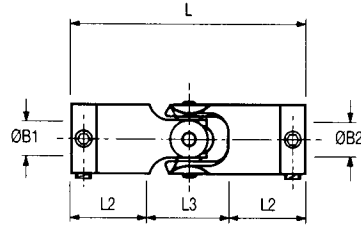
Note: To remain within the capacity of the joint, the result of speed x working angle must be less than 10000.

See next page for larger joints

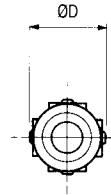
Single joints



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

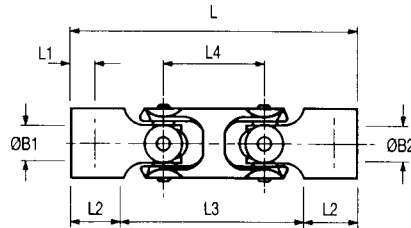


Ref. 103
Headed brass inserts fitted 2 screws
per end (size 6, one screw)

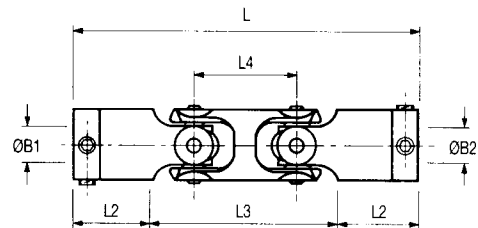


Typical

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

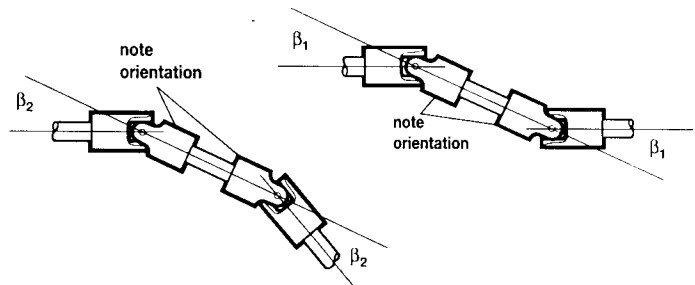
The velocity ratio of single universal joints is not constant when the working angle is greater than zero. Their geometry gives rise to sinusoidal fluctuations at the output that increase with the working angle and which vary between:

$$\omega \cos \beta \text{ and } \omega \sec \beta$$

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:

- The orientation of two single joints is correct; the inboard forks should align as in double joints.
- 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.