

Rotary Inertia Conversion Table

A \ B	gm-cm²	oz-in²	gm-cm-s²	Kg-cm²	lb-in²	oz-in-s²	lb-ft²	Kg-cm-s²	lb-in-s²	lb-ft-s² or slug-ft²
gm-cm²	1	5.46×10^{-3}	1.01×10^{-3}	10^{-3}	3.417×10^{-4}	1.41×10^{-5}	2.37×10^{-6}	1.01×10^{-6}	8.85×10^{-7}	7.37×10^{-8}
oz-in²	182.9	1	.186	.182	.0625	2.59×10^{-3}	4.34×10^{-4}	1.86×10^{-4}	1.61×10^{-4}	1.34×10^{-5}
gm-cm-s²	980.6	5.36	1	.9806	.335	1.38×10^{-2}	2.32×10^{-3}	10^{-3}	8.67×10^{-4}	7.23×10^{-5}
Kg-cm²	1000	5.46	1.019	1	.3417	1.41×10^{-2}	2.37×10^{-3}	1.019×10^{-3}	8.85×10^{-4}	7.37×10^{-5}
lb-in²	2.92×10^3	16	2.984	2.926	1	4.14×10^{-2}	6.94×10^{-3}	2.98×10^{-3}	2.59×10^{-3}	2.15×10^{-4}
oz-in-s²	7.06×10^4	386.08	72.0	70.615	24.13	1	.1675	7.20×10^{-2}	6.25×10^{-2}	5.20×10^{-3}
lb-ft²	4.21×10^5	2304	429.71	421.40	144	5.967	1	.4297	.3729	3.10×10^{-2}
Kg-cm-s²	9.80×10^5	5.36×10^3	1000	980.66	335.10	13.887	2.327	1	.8679	7.23×10^{-2}
lb-in-s²	$\frac{1.129 \times 10^6}{10^6}$	6.177×10^3	1.152×10^3	1.129×10^3	386.08	16	2.681	1.152	1	8.33×10^{-2}
lb-ft-s² or slug-ft²	$\frac{1.355 \times 10^7}{10^7}$	7.41×10^4	1.38×10^4	1.35×10^4	4.63×10^3	192	32.1	13.825	12	1

Torque Conversion Table

A \ B	dyne-cm	gm-cm	oz-in	Kg-cm	lb-in	N-m	lb-ft	Kg-m
dyne-cm	1	1.019×10^{-3}	1.46×10^{-5}	1.0197×10^{-6}	8.850×10^{-7}	10^{-7}	7.375×10^{-8}	1.019×10^{-8}
gm-cm	980.665	1	1.388×10^{-2}	10^{-3}	8.679×10^{-4}	9.806×10^{-5}	7.233×10^{-5}	10^{-5}
oz-in	7.061×10^4	72.07	1	7.20×10^{-2}	6.25×10^{-2}	7.061×10^{-3}	5.208×10^{-2}	10^{-2}
Kg-cm	1.129×10^5	1000	13.877	1	.8679	9.806×10^{-2}	7.233×10^{-2}	10^{-2}
lb-in	1.129×10^6	1.152×10^3	16	1.152	1	.112	8.333×10^{-2}	1.152×10^{-2}
N-m	10^7	1.019×10^4	141.612	10.197	8.850	1	7.37	.101
lb-ft	1.355×10^7	1.382×10^4	192	13.825	12	1.355	1	.138
Kg-m	9.806×10^7	105	1.388×10^3	100	86.796	9.806	7.233	1

How to use tables:

To convert from units in column A to units in row B, find the corresponding entry and multiply.

To Convert To	Multiply # Of	By
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LENGTH

cm	inches	2.54
cm	feet	30.48
inches	cm	.3937
inches	feet	12
feet	cm	3.281×10^{-2}
feet	inches	8.333×10^{-2}

MASS

gm	oz	28.35
gm	lb	453.6
gm	slug	1.459×10^{-4}
oz	gm	3.527×10^{-2}
oz	lb	16
oz	slug	514.7
lb	gm	2.205×10^{-3}
lb	oz	6.250×10^{-3}
lb	slug	32.17
slug*	gm	6.853×10^{-5}
slug	oz	1.943×10^{-3}
slug	lb	3.108×10^{-2}

*1 slug mass goes at 1 ft/sec² when acted on by 1 lb force

POWER

H.P.	(oz-in.) (deg./sec)	1.653×10^{-7}
H.P.	(oz-in.) (RPM)	9.917×10^{-7}
H.P.	(#ft) (deg./sec)	3.173×10^{-5}
H.P.	(#ft) (RPM)	1.904×10^{-4}
H.P.	watts	1.341×10^{-3}
Watts	(oz-in.) (deg./sec.)	1.232×10^{-4}
Watts	(oz-in.) (RPM)	7.395×10^{-4}
Watts	(#ft) (deg./sec)	2.366×10^{-2}
Watts	(#ft) (RPM)	.1420
Watts	watts	745.7

TORQUE TO INERTIA RATIO

rad/sec ²	oz-in./gm-cm ²	7.062×10^4
rad/sec ²	oz-in./oz-in ²	386.1

TORQUE GRADIENT

#ft/rad	oz-in./degree	0.2984
dyne-cm/rad	oz-in./degree	4.046×10^6

To Convert To	Multiply # Of	By
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FORCE

dyne	gm*	980.7
dyne	oz	2.780×10^4
dyne	lb	4.448×10^5
gm*	dyne	1.020×10^{-3}
oz	dyne	3.547×10^{-5}
lb	dyne	2.248×10^{-6}

* used as force units

ROTATION

degrees/sec	RPM	6
degrees/sec	rad/sec.	57.3
RPM	degrees/sec.	.1667
RPM	rad/sec.	9.549
rad/sec	degrees/sec.	1.745×10^{-2}
rad/sec	RPM	.1047

MECHANISM EFFICIENCIES

Acme-Screw W/Brass Nut	~0.35-0.65
Acme-Screw W/ Plastic Nut	~0.50-0.85
Ball Screw	~0.85-0.95
Preloaded Ball Screw	~0.75-0.85
Spur or Bevel Gears	~0.90
Timing Belts	~0.96-0.98
Chain & Sprocket	~0.95-0.98
Worm Gears	~0.45-0.85

MATERIAL DENSITIES

Material	lb/in ³	gm/cm ³
Aluminum	0.096	2.66
Brass	0.300	8.30
Bronze	0.295	8.17
Copper	0.322	8.91
Plastic	0.040	1.11
Steel	0.280	7.75
Hard Wood	0.029	0.80

FRICTION COEFFICIENTS $F_{tr} = \mu W_L$

Materials	μ	Mechanism	μ
Steel on Steel	~0.58	Ball Bushings	<0.001
Steel on Steel (greased)	~0.15	Linear Bearings	<0.001
Aluminum on Steel	~0.45	Dovetail Slides	~0.2++
Copper on Steel	~0.30	Gibb Ways	~0.5++
Brass on Steel	~0.35		
Plastic on Steel	~0.15-0.25		