



# VACUUM VACUUM GUIDE 2

- 
- Various Unit Conversions ..... A 02

## VARIOUS UNIT CONVERSIONS

| To convert               | Into                     | Multiply by             |
|--------------------------|--------------------------|-------------------------|
| ampere-turn              | gilbert                  | 1.257                   |
| ampere-turn/cm           | ampere.turn/in           | 2.54                    |
| ampere-turn/in           | Gilbert/cm               | 0.495                   |
| ampere-turn/in           | ampere.turn/cm           | 0.3937                  |
| ampere/cm <sup>2</sup>   | Ampere/in                | 6.452                   |
| angstrom                 | microinch                | 0.00393                 |
| angstrom                 | millimicron              | 0.1                     |
| angstrom                 | cm                       | 10 <sup>8</sup>         |
| angstrom                 | nanometer                | 0.1                     |
| angstrom                 | micron                   | 10 <sup>-4</sup>        |
| b/mil ft                 | grams/cm <sup>3</sup>    | 2.306.10 <sup>6</sup>   |
| Btu                      | joule                    | 1055.1                  |
| Btu                      | kilowatt.hour            | 2.9290.10 <sup>-4</sup> |
| Btu                      | ft.lb                    | 777.6                   |
| Btu/minute               | watt                     | 17.57                   |
| calorie (kg)             | joule                    | 4184                    |
| calorie (kg)             | Btu                      | 3.968                   |
| calorie (kg)             | horsepower.hr            | 1.558.10 <sup>-3</sup>  |
| calorie (kg)             | ft.lb                    | 3086                    |
| calories (kg)            | kilowatt.hour            | 1.162.10 <sup>-3</sup>  |
| circular mil             | cm <sup>2</sup>          | 5.067.10 <sup>-6</sup>  |
| circular mil             | in <sup>2</sup>          | 7.854.10 <sup>-7</sup>  |
| circular mil sq          | mil                      | 0.7854                  |
| cm                       | mil                      | 393.7                   |
| cm                       | inch                     | 0.3937                  |
| cm                       | angstrom                 | 10 <sup>8</sup>         |
| cm <sup>2</sup>          | ft <sup>2</sup>          | 1.076.10 <sup>-3</sup>  |
| cm <sup>2</sup>          | circular mil             | 1.974.10 <sup>5</sup>   |
| cm <sup>2</sup>          | in <sup>2</sup>          | 0.155                   |
| cm <sup>3</sup>          | gallon                   | 2.642.10 <sup>-4</sup>  |
| cm <sup>3</sup>          | in <sup>3</sup>          | 6.102.10 <sup>-2</sup>  |
| cm <sup>3</sup>          | quarts (liquid)          | 1.057.10 <sup>-3</sup>  |
| cm <sup>3</sup>          | liter                    | 10 <sup>-3</sup>        |
| cm <sup>3</sup>          | ft <sup>3</sup>          | 3.531.10 <sup>-5</sup>  |
| cm <sup>3</sup>          | pints (liquid)           | 2.113.10 <sup>-3</sup>  |
| coulombs/in <sup>2</sup> | coulombs/cm <sup>2</sup> | 0.155                   |
| degree (angle)           | minute                   | 60                      |
| degree (angle)           | second                   | 3600                    |
| degree (angle)           | radian                   | 0.01745                 |
| degree/sec               | radian/sec               | 0.01745                 |
| degree/sec               | revolution/sec           | 0.002778                |
| degree/sec               | rpm                      | 0.1667                  |
| dyne                     | pound                    | 2.248.10 <sup>-6</sup>  |
| dyne                     | gram                     | 1.020.10 <sup>-3</sup>  |
| dynes/cm <sup>2</sup>    | bar                      | 10 <sup>-6</sup>        |

| To convert           | Into                  | Multiply by                |
|----------------------|-----------------------|----------------------------|
| erg                  | dyne.cm               | 1                          |
| erg                  | kg.meter              | 1.020.10 <sup>-8</sup>     |
| erg                  | gram.cm               | 1.020.10 <sup>-3</sup>     |
| erg                  | ft.lb                 | 7.376.10 <sup>-8</sup>     |
| erg                  | kg.calorie            | 2.390.10 <sup>-11</sup>    |
| erg                  | joule                 | 10 <sup>-7</sup>           |
| erg                  | Btu                   | 9.486.10 <sup>-11</sup>    |
| ergs/sec             | Btu/min               | 5.691.10 <sup>-9</sup>     |
| ergs/sec             | kilowatt              | 10 <sup>-10</sup>          |
| ergs/sec             | ft.lb/min             | 4.42.10 <sup>-6</sup>      |
| eV                   | joule                 | 1.602177.10 <sup>-19</sup> |
| feet                 | cm                    | 30.48                      |
| feet                 | meter                 | 0.3048                     |
| ft-lb                | meter.kilogram        | 0.1383                     |
| ft-lb                | cm.gram               | 13.826                     |
| ft-lb                | cm.dyne               | 1.356.10 <sup>7</sup>      |
| ft <sup>2</sup>      | in <sup>2</sup>       | 144                        |
| ft <sup>2</sup>      | m <sup>2</sup>        | 0.0929                     |
| ft <sup>2</sup>      | cm <sup>2</sup>       | 929                        |
| ft <sup>3</sup>      | lb.water              | 62.4                       |
| ft <sup>3</sup>      | liter                 | 28.32                      |
| ft <sup>3</sup>      | pint (liquid)         | 59.84                      |
| ft <sup>3</sup>      | cm <sup>3</sup>       | 2.832.10 <sup>4</sup>      |
| ft <sup>3</sup>      | in <sup>3</sup>       | 1728                       |
| ft <sup>3</sup>      | m <sup>3</sup>        | 0.02832                    |
| ft <sup>3</sup>      | quart (liquid)        | 29.92                      |
| ft <sup>3</sup>      | gallon                | 7.481                      |
| ft <sup>3</sup>      | yd <sup>3</sup>       | 0.03704                    |
| ft <sup>3</sup> /min | gallon/sec            | 0.1247                     |
| ft <sup>3</sup> /min | cm <sup>3</sup> /sec  | 471.9                      |
| ft <sup>3</sup> /min | liter/sec             | 0.4719                     |
| gallon               | quart (liquid)        | 4                          |
| gallon               | liter                 | 3.7854                     |
| gallon               | cm <sup>3</sup>       | 37854                      |
| gallon               | pint (liquid)         | 8                          |
| gallon               | ft <sup>3</sup>       | 0.1337                     |
| gallon               | lb.water              | 8.34                       |
| gallon               | in <sup>3</sup>       | 231                        |
| gallon               | m <sup>3</sup>        | 3.785.10 <sup>-3</sup>     |
| gallon/min           | liter/sec             | 0.064                      |
| gallon/min           | ft <sup>3</sup> /sec  | 2.228.10 <sup>-3</sup>     |
| gauss                | lines/in <sup>2</sup> | 6.452                      |
| gilbert              | ampere.turn           | 0.7958                     |
| gram                 | oz                    | 0.03527                    |
| gram                 | dyne                  | 980.7                      |

| To convert           | Into                   | Multiply by            |
|----------------------|------------------------|------------------------|
| gram                 | lb                     | 2.205.10 <sup>-3</sup> |
| gram-calorie         | Btu                    | 3.968.10 <sup>-3</sup> |
| gram-cm              | kg.meter               | 10 <sup>-5</sup>       |
| gram-cm              | joule                  | 9.807.10 <sup>-5</sup> |
| gram-cm              | ft.lb                  | 7.233.10 <sup>-5</sup> |
| gram-cm              | erg                    | 980.7                  |
| gram-cm              | Btu                    | 9.302.10 <sup>-8</sup> |
| gram-cm              | kg.calorie             | 2.344.10 <sup>-8</sup> |
| gram/cm              | lb/in                  | 5.6.10 <sup>-3</sup>   |
| gram/cm <sup>3</sup> | lb/circular mil ft     | 3.405.10 <sup>-7</sup> |
| gram/cm <sup>3</sup> | lb/in <sup>3</sup>     | 0.03613                |
| gram/cm <sup>3</sup> | lb/ft <sup>3</sup>     | 62.43                  |
| horsepower           | j/s                    | 745.70                 |
| horsepower           | horsepower (EU metric) | 1.014                  |
| horsepower (UK)      | watt                   | 745.7                  |
| in <sup>2</sup>      | ft <sup>2</sup>        | 6.944.10 <sup>-3</sup> |
| in <sup>2</sup>      | cm <sup>2</sup>        | 6.4516                 |
| in <sup>2</sup>      | mm <sup>2</sup>        | 645.2                  |
| in <sup>3</sup>      | pint (liquid)          | 0.0346322              |
| in <sup>3</sup>      | quart (liquid)         | 0.01732                |
| in <sup>3</sup>      | liter                  | 1.639.10 <sup>-2</sup> |
| in <sup>3</sup>      | gallon                 | 4.329.10 <sup>-3</sup> |
| in <sup>3</sup>      | m <sup>3</sup>         | 1.639.10 <sup>-5</sup> |
| in <sup>3</sup>      | ft <sup>3</sup>        | 5.787.10 <sup>-4</sup> |
| in <sup>3</sup>      | cm <sup>3</sup>        | 16.39                  |
| inch                 | angstrom               | 2.54.108               |
| inch                 | cm                     | 2.54                   |
| joule                | watt.hour              | 2.778.10 <sup>-4</sup> |
| joule                | calorie                | 2389.10 <sup>-4</sup>  |
| joule                | ft.lb                  | 0.7377                 |
| joule                | erg                    | 10 <sup>7</sup>        |
| joule                | Btu                    | 9.486.10 <sup>-4</sup> |
| kilogram             | tons (short)           | 1.102.10 <sup>-3</sup> |
| kilogram             | lb                     | 2.2046                 |
| kilogram (force)     | dyne                   | 980665                 |
| kilogram-meter       | kilowatt.hour          | 2.724.10 <sup>-6</sup> |
| kiloline             | maxwell                | 10 <sup>3</sup>        |
| kilometer            | mile                   | 0.6214                 |
| kilometer            | feet                   | 3281                   |
| kilowatt             | ft.lb/sec              | 737.6                  |
| kilowatt             | ft.lb/min              | 4.425.10 <sup>4</sup>  |
| kilowatt             | Btu/minute             | 56.92                  |
| kilowatt-hour        | kilogram.meter         | 3.671.10 <sup>5</sup>  |
| kilowatt-hour        | joule                  | 3.6.10 <sup>6</sup>    |
| kilowatt-hour        | ft.lb                  | 2.655.10 <sup>6</sup>  |
| kilowatt-hour        | Btu                    | 3415                   |
| km/hour              | m/min                  | 16.67                  |

| To convert            | Into                 | Multiply by            |
|-----------------------|----------------------|------------------------|
| km/hour               | mile/hour            | 0.6214                 |
| km/hour               | ft/sec               | 0.9113                 |
| km/hour               | ft/min               | 54.68                  |
| km/hour               | cm/sec               | 27.78                  |
| km <sup>2</sup>       | ft <sup>2</sup>      | 1.076.10 <sup>7</sup>  |
| lb water              | gallon               | 0.1198                 |
| lb water              | in <sup>3</sup>      | 27.68                  |
| lb water              | ft <sup>3</sup>      | 0.01602                |
| lb water/min          | ft <sup>3</sup> /sec | 2.669.10 <sup>-4</sup> |
| lb/ft                 | kg/meter             | 1.488                  |
| lb/ft <sup>2</sup>    | kg/m <sup>2</sup>    | 4.882                  |
| lb/ft <sup>2</sup>    | ft. water            | 0.01602                |
| lb/ft <sup>2</sup>    | lb/in <sup>2</sup>   | 6.944.10 <sup>-3</sup> |
| lb/in                 | grams/cm             | 178.6                  |
| lb/in <sup>2</sup>    | lb/ft <sup>2</sup>   | 144                    |
| lb/in <sup>2</sup>    | kg/m <sup>2</sup>    | 703.1                  |
| lb/in <sup>2</sup>    | in.Hg                | 2.036                  |
| lb/in <sup>2</sup>    | ft.water             | 2.307                  |
| lb/in <sup>2</sup>    | atmosphere           | 0.06804                |
| lines/cm <sup>2</sup> | gauss                | 1                      |
| lines/in <sup>2</sup> | gauss                | 0.155                  |
| liter                 | quart (liquid)       | 1.057                  |
| liter                 | pint (liquid)        | 2.113                  |
| liter                 | gallon               | 0.2642                 |
| liter                 | in <sup>3</sup>      | 61.02                  |
| liter                 | ft <sup>3</sup>      | 0.03531                |
| liter/min             | gallon/sec           | 4.403.10 <sup>-3</sup> |
| liter/min             | ft <sup>3</sup> /sec | 5.885.10 <sup>-4</sup> |
| lumen/ft <sup>2</sup> | foot.candle          | 1                      |
| m/min                 | miles/hour           | 0.03728                |
| m/min                 | km/hour              | 0.06                   |
| m/min                 | ft/sec               | 0.05468                |
| m/sec                 | miles/min            | 0.03728                |
| m/sec                 | km/min               | 0.06                   |
| m/sec                 | km/hr                | 3.6                    |
| m/sec                 | ft/sec               | 3.281                  |
| m/sec                 | ft/min               | 196.8                  |
| m/sec                 | miles/hour           | 2.237                  |
| m <sup>2</sup>        | sq mile              | 3.861.10 <sup>-7</sup> |
| m <sup>2</sup>        | ft <sup>2</sup>      | 10.764                 |
| m <sup>3</sup>        | quarts (liquid)      | 1057                   |
| m <sup>3</sup>        | pints (liquid)       | 2113                   |
| m <sup>3</sup>        | gallon               | 264.2                  |
| m <sup>3</sup>        | in <sup>3</sup>      | 61024                  |
| m <sup>3</sup>        | ft <sup>3</sup>      | 35.31                  |
| m <sup>3</sup>        | cm <sup>3</sup>      | 10 <sup>6</sup>        |
| maxwell               | kiloline             | 36802                  |

| To convert                          | Into                     | Multiply by            |
|-------------------------------------|--------------------------|------------------------|
| megaline                            | maxwell                  | 10 <sup>6</sup>        |
| meter                               | inch                     | 39.37                  |
| meter                               | feet                     | 3.2808                 |
| meter                               | angstrom                 | 10 <sup>10</sup>       |
| mhos/mil ft                         | megmhos/in <sup>3</sup>  | 15.28                  |
| mhos/mil ft                         | megmhos/cm <sup>3</sup>  | 6.015                  |
| microhm/cm <sup>3</sup><br>ohms/mil | ft                       | 6.015                  |
| microhm/cm <sup>3</sup>             | microhms/in <sup>3</sup> | 0.3937                 |
| microhm/in <sup>3</sup>             | microhm/cm <sup>3</sup>  | 2.54                   |
| microinch                           | angstrom                 | 254                    |
| micromicron                         | angstrom                 | 0.01                   |
| micron                              | angstrom                 | 10000                  |
| mil                                 | inch                     | 36802                  |
| mil                                 | cm                       | 0.0025                 |
| milliliter                          | cm <sup>3</sup>          | 1                      |
| millimeter                          | mil                      | 39.37                  |
| millimeter                          | micron                   | 1000                   |
| millimeter                          | inch                     | 0.03937                |
| millimeter                          | angstrom                 | 107                    |
| millimicron                         | angstrom                 | 10                     |
| minute                              | seconds (angle)          | 60                     |
| minutes (angle)                     | radian                   | 2.909.10 <sup>-4</sup> |
| mm <sup>2</sup>                     | in <sup>2</sup>          | 1.55.10 <sup>-3</sup>  |
| mm <sup>2</sup>                     | cm <sup>2</sup>          | 0.01                   |
| mm <sup>2</sup> circular            | mil                      | 1.974.103              |
| nanometer                           | micron                   | 10 <sup>-3</sup>       |
| ohms/mil ft                         | microhm/in <sup>3</sup>  | 0.06524                |
| ohms/mil ft                         | microhm/cm <sup>3</sup>  | 0.1662                 |
| ounces (fluid)                      | liter                    | 0.02957                |
| ounces (fluid)                      | in <sup>3</sup>          | 1.805                  |
| oz/in <sup>2</sup>                  | psi                      | 0.0625                 |
| pints (liquid)                      | in <sup>3</sup>          | 28.88                  |
| pints (dry)                         | in <sup>3</sup>          | 33.6                   |
| pound                               | oz                       | 16                     |
| pound                               | gram                     | 453.6                  |
| pound (force)                       | dyne                     | 444823                 |
| quadrants (angle)                   | radian                   | 1.571                  |
| quadrants (angle)                   | minute                   | 5400                   |
| quadrants (angle)                   | degree                   | 90                     |
| quart fluid                         | ounce                    | 32                     |
| quarts (liquid)                     | in <sup>3</sup>          | 57.75                  |
| quarts (dry)                        | in <sup>3</sup>          | 67.2                   |
| radian                              | degrees/sec              | 57.3                   |
| radian                              | quadrant                 | 0.637                  |
| radian                              | minute                   | 3438                   |
| radian                              | degree                   | 57.3                   |

| To convert            | Into            | Multiply by            |
|-----------------------|-----------------|------------------------|
| radians/sec           | revolutions/sec | 0.1592                 |
| radians/sec           | rpm             | 9.549                  |
| revolution            | radian          | 6.283                  |
| revolution            | quadrant        | 4                      |
| revolution            | degree          | 360                    |
| revolutions/sec       | rpm             | 60                     |
| revolutions/sec       | radians/sec     | 6.283                  |
| revolutions/sec       | degrees/sec     | 360                    |
| rpm                   | revolutions/sec | 0.01667                |
| rpm                   | radians/sec     | 0.1047                 |
| rpm                   | degrees/sec     | 6                      |
| seconds (angle)       | radian          | 4.848.10 <sup>-6</sup> |
| spheres (solid angle) | steradian       | 12.57                  |
| spherical rt. angle   | steradian       | 1.571                  |
| spherical rt. angle   | sphere          | 0.125                  |
| spherical rt. angle   | hemisphere      | 0.25                   |
| steradian             | sphere          | 0.07958                |
| steradian             | hemisphere      | 0.1592                 |
| stere                 | liter           | 10 <sup>3</sup>        |
| tons (short)          | lb              | 2000                   |
| tons (short)          | kg              | 907.2                  |
| tons (metric)         | lb              | 2205                   |
| tons (metric)         | kg              | 10 <sup>3</sup>        |
| tons (long)           | lb              | 2240                   |
| tons (long)           | kg              | 1016                   |
| watt                  | kilowatt        | 36802                  |
| watt                  | ft.lb/sec       | 0.7376                 |
| watt                  | ft.lb/min       | 44.25                  |
| watt                  | ergs/sec        | 10 <sup>7</sup>        |
| watt                  | Btu/min         | 0.05692                |
| watt-hour             | kilogram.meter  | 367.1                  |
| watt-hour             | ft.lb           | 2655                   |
| watt-hour             | Btu             | 3.414                  |
| weber                 | maxwell         | 10 <sup>8</sup>        |



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