

# Package ‘measurements’

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**Title** Tools for Units of Measurement

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**Description** Collection of tools to make working with physical measurements easier. Convert between metric and imperial units, or calculate a dimension's unknown value from other dimensions' measurements.

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conv\_dim

*Convert Dimensions of Measurement***Description**

Converts between dimensions of measurement given a transition dimension (the dimension that "bridges" x and y, e.g. liters per second, lbs per acre). Note that 2 of the 3 measurements (x, y, or trans) must be defined to calculate the 3rd. See [conv\\_unit\\_options](#) for all options.

**Usage**

```
conv_dim(x, x_unit, trans, trans_unit, y, y_unit)
```

**Arguments**

x	a numeric vector giving the measurement value in the first dimension.
x_unit	the unit in which x was measured.
trans	a numeric vector giving the measurement value in the transition dimension.
trans_unit	the unit in which trans was measured.
y	a numeric vector giving the measurement value in the second dimension.
y_unit	the unit in which y was measured.

**Details**

This function supports all dimensions in `conv_unit_options` except for coordinates. The conversion values have been defined based primarily from international weight and measurement authorities (e.g. General Conference on Weights and Measures, International Committee for Weights and Measures, etc.). While much effort was made to make conversions as accurate as possible, you should check the accuracy of conversions to ensure that conversions are precise enough for your applications.

**Note**

**Duration** Years are defined as 365.25 days and months are defined as 1/12 a year.

**Energy** cal is a thermochemical calorie (4.184 J) and Cal is 1000 cal (kcal or 4184 J).

**Flow** All gallon-based units are US gallons.

**Mass** All non-metric units are based on the avoirdupois system.

**Power** hp is mechanical horsepower, or 745.69 W.

**Speed** mach is calculated at sea level at 15 °C.

**Author(s)**

Matthew A. Birk, <matthewabirk@gmail.com>

**See Also**

[conv\\_unit\\_options](#), [conv\\_unit](#)

**Examples**

```
# How many minutes does it take to travel 100 meters at 3 feet per second?
conv_dim(x = 100, x_unit = "m", trans = 3, trans_unit = "ft_per_sec", y_unit = "min")

# How many degrees does the temperature increase with an increase in 4 kPa given 0.8 Celcius
# increase per psi?
conv_dim(x_unit = "C", trans = 0.8, trans_unit = "C_per_psi", y = 4, y_unit = "kPa")

# Find the densities given volume and mass measurements.
conv_dim(x = c(60, 80), x_unit = "ft3", trans_unit = "kg_per_l", y = c(6e6, 4e6), y_unit = "g")
```

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conv\_multiunit

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*Convert Units of Measurement Composed of Multiple Units*


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**Description**

Converts complex units of measurement that are joined by " / " or " \* ". This function supports all dimensions in conv\_unit\_options except for coordinates.

**Usage**

```
conv_multiunit(x = 1, from, to)
```

**Arguments**

x	a numeric vector giving the measurement value in its original units. Default is 1.
from, to	a string defining the multiunit with subunits separated by " / " or " * ".

**Author(s)**

Matthew A. Birk, <matthewabirk@gmail.com>

**See Also**

[conv\\_unit](#), [conv\\_unit\\_options](#), [conv\\_dim](#)

**Examples**

```
conv_multiunit(x = 10, from = "ft / hr * F", to = "m / min * C")
conv_multiunit(x = 1:100, from = "gal_per_min * ft / psi * hp", to = "l_per_hr * km / kPa * kW")
```

conv\_unit

*Convert Units of Measurement***Description**

Converts common units of measurement for a variety of dimensions. See [conv\\_unit\\_options](#) for all options.

**Usage**

```
conv_unit(x, from, to)
```

**Arguments**

x	a numeric vector giving the measurement value in its original units.
from	the unit in which the measurement was made.
to	the unit to which the measurement is to be converted.

**Details**

**Acceleration** mm\_per\_sec2, cm\_per\_sec2, m\_per\_sec2, km\_per\_sec2, grav, inch\_per\_sec2, ft\_per\_sec2, mi\_per\_sec2, kph\_per\_sec, mph\_per\_sec

**Angle** degree, radian, grad, arcmin, arcsec, turn

**Area** nm2, um2, mm2, cm2, m2, hectare, km2, inch2, ft2, yd2, acre, mi2, naut\_mi2

**Coordinate** dec\_deg, deg\_dec\_min, deg\_min\_sec (see note)

**Count** fmol, pmol, nmol, umol, mmol, mol

**Duration** nsec, usec, msec, sec, min, hr, day, wk, mon, yr, dec, cen, mil, Ma

**Energy** J, kJ, erg, cal, Cal, Wsec, kWh, MWh, BTU

**File size** byte, KB, MB, GB, TB, PB, bit, Kbit, Mbit, Gbit, Tbit, Pbit

**Flow** ml\_per\_sec, ml\_per\_min, ml\_per\_hr, l\_per\_sec, l\_per\_min, l\_per\_hr, m3\_per\_sec, m3\_per\_min, m3\_per\_hr, gal\_per\_sec, gal\_per\_min, gal\_per\_hr, ft3\_per\_sec, ft3\_per\_min, ft3\_per\_hr, Sv

**Length** angstrom, nm, um, mm, cm, dm, m, km, inch, ft, yd, fathom, mi, naut\_mi, au, light\_yr, parsec, point

**Mass** Da, fg, pg, ng, ug, mg, g, kg, Mg, Gg, Tg, Pg, carat, metric\_ton, oz, lbs, short\_ton, long\_ton, stone

**Power** uW, mW, W, kW, MW, GW, erg\_per\_sec, cal\_per\_sec, cal\_per\_hr, Cal\_per\_sec, Cal\_per\_hr, BTU\_per\_sec, BTU\_per\_hr, hp

**Pressure** uatm, atm, Pa, hPa, kPa, torr, mmHg, inHg, cmH2O, inH2O, mbar, bar, dbar, psi

**Speed** mm\_per\_sec, cm\_per\_sec, m\_per\_sec, km\_per\_sec, inch\_per\_sec, ft\_per\_sec, kph, mph, km\_per\_day, mi\_per\_day, knot, mach, light

**Temperature** C, F, K, R

**Torque** N-m, ft-lbs, inch-lbs

**Volume** ul, ml, dl, l, cm3, dm3, m3, km3, us\_tsp, us\_tbsp, us\_oz, us\_cup, us\_pint, us\_quart, us\_gal, inch3, ft3, mi3, imp\_tsp, imp\_tbsp, imp\_oz, imp\_cup, imp\_pint, imp\_quart, imp\_gal

The conversion values have been defined based primarily from international weight and measurement authorities (e.g. General Conference on Weights and Measures, International Committee for Weights and Measures, etc.). While much effort was made to make conversions as accurate as possible, you should check the accuracy of conversions to ensure that conversions are precise enough for your applications.

## Note

**Duration** Years are defined as 365.25 days and months are defined as 1/12 a year.

**Coordinate** Values must be entered as a string with one space between subunits (e.g. 70° 33' 11" = "70 33 11").

**Energy** cal is a thermochemical calorie (4.184 J) and Cal is 1000 cal (kcal or 4184 J).

**Flow** All gallon-based units are US gallons.

**Mass** All non-metric units are based on the avoirdupois system.

**Power** hp is mechanical horsepower, or 745.69 W.

**Pressure** cmH2O is defined at 4 °C.

**Pressure** inH2O is defined at 60 °F.

**Speed** mach is calculated at sea level at 15 °C.

## Author(s)

Matthew A. Birk, <matthewabirk@gmail.com>

## See Also

[conv\\_unit\\_options](#), [conv\\_dim](#)

## Examples

```
conv_unit(2.54, "cm", "inch") # Result = 1 inch

conv_unit(seq(1, 10), "kg", "short_ton") # A vector of measurement values can be converted

# Convert 1, 10, and 100 meters to all other length units
sapply(conv_unit_options$length, function(x) conv_unit(c(1, 10, 100), "m", x))

conv_unit("33 1 1", "deg_min_sec", "deg_deg")

conv_unit(c("101 44.32", "3 19.453"), "deg_dec_min", "deg_min_sec")
```

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`conv_unit_options`*Unit of Measurement Conversion Options*

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**Description**

Shows what units of measurement can be converted with the function `conv_unit`.

**Usage**

```
conv_unit_options
```

**Format**

A list with all units available for conversion using `conv_unit`.

**Details**

**Duration** Years are defined as 365.25 days and months are defined as 1/12 a year.

**Coordinate** Values must be entered as a string with one space between subunits (e.g. 70° 33' 11" = "70 33 11").

**Energy** cal is a thermochemical calorie (4.184 J) and Cal is 1000 cal (kcal or 4184 J).

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**Source**

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**See Also**

`conv_unit`

**Examples**

```
conv_unit_options  
conv_unit_options$pressure
```

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measurements*Tools for Units of Measurement*

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**Author(s)**

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