Package 'measurements'

April 28, 2023

Type Package

Title Tools for Units of Measurement

Version 1.5.1

Date 2023-04-28

Author Matthew A. Birk

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

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.

License GPL-3

Encoding UTF-8

RoxygenNote 7.2.3

NeedsCompilation no

Repository CRAN

Date/Publication 2023-04-28 19:40:02 UTC

R topics documented:

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")
```

---

conv_multiunit *Convert Units of Measurement Composed of Multiple Units*

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", "dec_deg")

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

conv_unit_options *Unit of Measurement Conversion Options*

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).

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>

Source

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.

See Also

conv_unit

Examples

```
conv_unit_options
conv_unit_options$pressure
```

`measurements` *Tools for Units of Measurement*

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.

Author(s)

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

Index