# HANS HAGEN CONTEXT MKIV



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### 1 Introduction

In ConTEXt MkII there is a module that implements consistent typesetting of units (quantities and dimensions). In MkIV this functionality is now part of the physics core modules. This is also one of the mechanisms that got a new user interface: instead of using commands we now parse text. Thanks to those users who provided input we're more complete now that in MkII. You can browse the mailing list archive to get some sense of history.

## 2 The main command

The core command is \unit. The argument to this command gets parsed and converted into a properly typeset dimension. Normally there will be a quantity in front.

```
\begin{array}{cccc} 10 \text{ meter} & & 10 \text{ m} \\ 10 \text{ meter per second} & & 10 \text{ m/s} \\ 10 \text{ square meter per second} & & 10 \text{ m}^2\!/\!\text{s} \end{array}
```

The parser knows about special cases, like synonyms:

```
10 degree celsius 10 °C
10 degrees celsius 10 °C
10 celsius 10 °C
```

The units can be rather complex, for example:

```
\unit{30 kilo pascal square meter / second kelvin}
```

This comes out as:  $30 \, \text{kPa·m}^2 / \text{s·K}$ . Depending on the unit at had, recognition is quite flexible. The following variants all work out ok.

```
10 kilogram 10 kg
10 kilo gram 10 kg
10 k gram 10 kg
10 kilo g 10 kg
10 k g 10 kg
10 kg 10 kg
10 kg 10 kg
10 kg 10 kg
```

Of course being consistent makes sense, so normally you will use a consistent mix of short or long keywords.

You can provide a qualifier that gets lowered and appended to the preceding unit.

```
\unit{112 decibel (A)}
```

This gives: 112 dB<sub>A</sub>. Combinations are also possible:

```
5 watt per meter celsius 5 W/m.°C
5 watt per meter degrees celsius 5 W/m.°C
5 watt per meter kelvin 5 W/m.K
5 watt per meter per kelvin 5 W/m/K
10 arcminute 10′
10 arcminute 20 arcsecond 10′ 20″
```

### 3 Extra units

To some extent units can be tuned. You can for instance influence the spacing between a number and a unit:

```
\unit{35 kilogram per cubic meter}
\setupunit[space=normal] \unit{35 kilogram per cubic meter}
\setupunit[space=big] \unit{35 kilogram per cubic meter}
\setupunit[space=small] \unit{35 kilogram per cubic meter}
\setupunit[space=none] \unit{35 kilogram per cubic meter}
```

Of course no spacing looks rather bad:

```
35 kg/m<sup>3</sup>
35 kg/m<sup>3</sup>
35 kg/m<sup>3</sup>
35 kg/m<sup>3</sup>
35 kg/m<sup>3</sup>
```

Another parameter is separator. In order to demonstrate this we define an extra unit command:

```
\defineunit[sunit][separator=small]
\defineunit[nunit][separator=none]
```

We now have two more commands:

```
\unit {35 kilogram cubic meter}
\sunit{35 kilogram cubic meter}
\nunit{35 kilogram cubic meter}
```

These three commands give different results:

```
35 \text{ kg} \cdot \text{m}^3
35 \text{ kg m}^3
```

```
35 \text{ kgm}^3
```

Valid separators are normal, big, medium, small, none. You can let units stand out by applying color or a specific style.

```
\setupunit[style=\bi,color=maincolor]
\unit{10 square meter per second}
```

Keep in mind that all defined units inherit from their parent definition unless they are set up themselves.

#### $10 \, \text{m}^2/\text{s}$

To some extent you can control rendering in text and math mode. As an example we define an extra instance.

```
\defineunit[textunit][alternative=text]
```

```
test
       \unit
                  {10 cubic meter per second} test
test \textunit{10 cubic meter per second} test
test $\unit
                  {10 cubic meter per second}$ test
test $\textunit{10 cubic meter per second}$ test
                     {cubic meter per second} test
test 10 \unit
test 10 \textunit{cubic meter per second} test
                     {cubic meter per second}$ test
test $10 \unit
test $10 \textunit{cubic meter per second}$ test
test 10 m<sup>3</sup>/s test
test 10m<sup>3</sup>/s test
test 10m<sup>3</sup>/s test
```

# 4 Labels

The units, prefixes and operators are typeset using the label mechanism which means that they can be made to adapt to a language and/or adapted. Instead of language specific labels you can also introduce mappings that don't relate to a language at all. As an example we define some bogus mapping.

```
\setupunittext
  [whatever]
  [meter=retem,
    second=dnoces]

\setupprefixtext
  [whatever]
  [kilo=olik]

\setupoperatortext
```

```
[whatever]
[solidus={ rep }]
```

Such a mapping can be partial and the current language will be the default fallback and itselfs falls back on the English language mapping.

```
\unit{10 km/s}
\unit{10 Kilo Meter/s}
\unit{10 kilo Meter/s}
\unit{10 Kilo m/s}
\unit{10 k Meter/s}
```

When we typeset this we get the normal rendering:

```
10 km/s
```

10 km/s

 $10 \, \text{km/s}$ 

10 km/s

 $10 \, \text{km/s}$ 

However, when we change the language parameter, we get a different result:

```
10 olikretem rep dnoces
```

10 olikretem rep dnoces

10 olikretem rep dnoces

10 olikretem rep dnoces

10 olikretem rep dnoces

The alternative rendering is set up as follows:

```
\setupunit[language=whatever]
```

You can also decide to use a special instance of units:

```
\defineunit[wunit][language=whatever]
```

This will define the \wunit command and leave the original \unit command untouched.

# 5 Digits

In addition to units we have digits. These can be used independently but the same functionality is also integrated in the unit commands. The main purpose of this command is formatting in tables, of which we give an example below.

```
12,345.67 kilogram 12,345.67 kg
__,__1.23 kilogram 1.23 kg
__,__.12 kilogram .12 kg
__,__1.== kilogram 1 kg
__, :23 kilogram 23 kg
```

The \_ character serves as placeholders. There are some assumptions to how numbers are constructed. In principe the input assumes a comma to separate thousands and a period to separate the fraction.

#### 10 km/s 10 km/s 10 km/s 10 km/s

You can swap periods and commas in the output. In fact there are a few methods available. For instance we can separate the thousands with a small space instead of a symbol.

```
\starttabulate[|c|r|r|]
\HL
\NC 0 \NC \setupunit[method=0]\unit{00,000.10 kilogram}
      \NC \setupunit[method=0]\unit{@@,@@0.10 kilogram} \NC \NR
\NC 1 \NC \setupunit[method=1]\unit{00,000.10 kilogram}
      \NC \setupunit[method=1]\unit{@@,@@0.10 kilogram} \NC \NR
\NC 2 \NC \setupunit[method=2]\unit{00,000.10 kilogram}
      \NC \setupunit[method=2]\unit{@@,@@0.10 kilogram} \NC \NR
\NC 3 \NC \setupunit[method=3]\unit{00,000.10 kilogram}
      \NC \setupunit[method=3]\unit{@@,@@0.10 kilogram} \NC \NR
\NC 4 \NC \setupunit[method=4]\unit{00,000.10 kilogram}
      \NC \setupunit[method=4]\unit{@@,@@0.10 kilogram} \NC \NR
\NC 5 \NC \setupunit[method=5]\unit{00,000.10 kilogram}
      \NC \setupunit[method=5]\unit{@@,@@0.10 kilogram} \NC \NR
\NC 6 \NC \setupunit[method=6]\unit{00,000.10 kilogram}
      \NC \setupunit[method=6]\unit{@@,@@0.10 kilogram} \NC \NR
\HL
\stoptabulate
```

| 0 | 00,000.10 kg              | $0.10\mathrm{kg}$   |
|---|---------------------------|---------------------|
| 1 | $00.000,10\mathrm{kg}$    | 0,10 kg             |
| 2 | 00,000.10 kg              | $0.10\mathrm{kg}$   |
| 3 | $00000$ , $10\mathrm{kg}$ | 0,10 kg             |
| 4 | $00000.10\mathrm{kg}$     | $0.10  \mathrm{kg}$ |
| 5 | 00 000,10 kg              | 0,10 kg             |
| 6 | $00\ 000.10\ kg$          | $0.10  \mathrm{kg}$ |
|   |                           |                     |

The digit modes can be summarized as::

- 1. periods/comma
- 2. commas/period
- 3. thinmuskips/comma
- 4. thinmuskips/period
- 5. thickmuskips/comma
- 6. thickmuskips/period

You can reverse the order of commas and period in the input by setting the parameter order to reverse.

The digit parser handles a bunch of special characters as well as different formats. We strongly suggest you to use the grouped call.

- . , . comma or period
- , ,. comma or period
- : invisible period
- ; invisible comma
- invisible space

```
/ invisible sign
- minus sign
+ plus sign
// invisible high sign
- high minus sign
++ high plus sign
= zero padding
```

Let's give some examples:

| 1                | 1                            |
|------------------|------------------------------|
| 12               | 12                           |
| 12.34            | 12.34                        |
| 123,456          | 123,456                      |
| 123,456.78       | 123,456.78                   |
| 12,34            | 12,34                        |
| . 1234           | .1234                        |
| 1234             | 1234                         |
| 123,456.78^9     | $123,456.78 \times 10^9$     |
| 123,456.78e9     | $123,456.78 \times 10^9$     |
| /123,456.78e-9   | $123,456.78 \times 10^{-9}$  |
| -123,456.78e-9   | $-123,456.78 \times 10^{-9}$ |
| +123,456.78e-9   | $+123,456.78 \times 10^{-9}$ |
| //123,456.78e-9  | $123,456.78 \times 10^{-9}$  |
| 123,456.78e-9    | $-123,456.78 \times 10^{-9}$ |
| ++123,456.78e-9  | $+123,456.78 \times 10^{-9}$ |
| ,,123,456,789.00 | 123,456,789.00               |
| ,,_12,345,678.== | 12,345,678                   |

# **6 Adding units**

It is possible to add extra snippets. This is a two step process: first some snippet is defined, next a proper label is set up. In the next example we define a couple of  $T_EX$  dimensions:

```
\registerunit
  [unit]
  [point=point,
   basepoint=basepoint,
   scaledpoint=scaledpoint,
   didot=didot,
   cicero=cicero]
```

Possible categories are: prefix, unit, operator, suffix, symbol, packaged. Next we define labels:

```
\setupunittext
[point=pt,
  basepoint=bp,
  scaledpoint=sp,
  didot=dd,
  cicero=cc]
```

Now we can use use these:

\unit{10 point / second}

Of course you can wonder what this means.

10 pt/s

When no label is defined the long name is used:

\registerunit
[unit]
[page=page]

This is used as:

\unit{10 point / page}

Which gives:

10 pt/page

# 7 Built in keywords

A given sequence of keywords is translated in an list of internal keywords. For instance m, Meter and meter all become meter and that one is used when resolving a label. In the next tables the right column mentions the internal keyword. The right column shows the Cased variant, but a lowercase one is built-in as well.

The following prefixes are built-in:

| units:operators |                   |      |
|-----------------|-------------------|------|
| OutOf           | outof             | :    |
| Per             | per               | /    |
| Solidus         | solidus           | /    |
| Times           | times             | •    |
| units:packaged  |                   |      |
| Micron          | micron            | μm   |
| mmHg            | millimetermercury | mmHg |
| units:prefixes  |                   |      |
| Atto            | atto              | a    |
| Centi           | centi             | C    |
| Deca            | deca              | da   |
| Deci            | deci              | d    |
| Exa             | exa               | E    |
| Exbi            | exbi              | Ei   |
| Femto           | femto             | f    |
| Gibi            | gibi              | Gi   |
| Giga            | giga              | G    |
|                 |                   |      |

| Hecto          | hecto          | h  |
|----------------|----------------|----|
| Kibi           | kibi           | Ki |
| Kilo           | kilo           | k  |
| Mebi           | mebi           | Mi |
| Mega           | mega           | M  |
| Micro          | micro          | μ  |
| Milli          | milli          | m  |
| Nano           | nano           | n  |
| Pebi           | pebi           | Pi |
| Peta           | peta           | P  |
| Pico           | pico           | p  |
| Root           | root           |    |
| Tebi           | tebi           | Ti |
| Tera           | tera           | T  |
| Yobi           | yobi           | Yi |
| Yocto          | yocto          | y  |
| Yotta          | yotta          | Y  |
| Zebi           | zebi           | Zi |
| Zepto          | zepto          | Z  |
| Zetta          | zetta          | Z  |
| units:suffixes |                |    |
| Cubic          | cubic          | 3  |
| ICubic         | icubic         | -3 |
| ILinear        | ilinear        | -1 |
| IQuadratic     | iquadratic     | -4 |
| ISquare        | isquare        | -2 |
| Inverse        | inverse        | -1 |
| Linear         | linear         | 1  |
| Quadratic      | quadratic      | 4  |
| Square         | square         | 2  |
| units:symbols  |                |    |
|                | percent        | %  |
| ArcMinute      | arcminute      | ,  |
| ArcSecond      | arcsecond      | "  |
| Degree         | degree         | 0  |
| Degrees        | degree         | ٥  |
| Percent        | percent        | %  |
| Permille       | permille       | ‰  |
| Promille       | permille       | ‰  |
| 0              | degree         | 0  |
| ,              | arcminute      | ,  |
| "              | arcsecond      | "  |
| units:units    |                |    |
| AMU            | atomicmassunit | u  |
| Ampere         | ampere         | A  |
| Angstrom       | angstrom       | Å  |
|                |                |    |

| Astronomical Unit  | astronomicalunit | au                   |
|--------------------|------------------|----------------------|
| AstronomicalUnit   | astronomicalunit | au                   |
| Atm                | atmosphere       | atm                  |
| Atmosphere         | atmosphere       | atm                  |
| Atomic Mass Unit   | atomicmassunit   | u                    |
| AtomicMassUnit     | atomicmassunit   | u                    |
| Bar                | bar              | bar                  |
| Barn               | barn             | b                    |
| Baud               | baud             | Bd                   |
| Bel                | bel              | В                    |
| Bequerel           | bequerel         | $\operatorname{Bq}$  |
| Bit                | bit              | bit                  |
| Byte               | byte             | В                    |
| Cal                | calorie          | cal                  |
| Calorie            | calorie          | cal                  |
| Candela            | candela          | cd                   |
| Celsius            | celsius          | °C                   |
| Coulomb            | coulomb          | C                    |
| Dalton             | dalton           | Da                   |
| Day                | day              | d                    |
| Degree Celsius     | celsius          | °C                   |
| Degree Fahrenheit  | fahrenheit       | $^{\circ}\mathrm{F}$ |
| DegreeCelsius      | celsius          | °C                   |
| DegreeFahrenheit   | fahrenheit       | $^{\circ}\mathrm{F}$ |
| Degrees Celsius    | celsius          | °C                   |
| Degrees Fahrenheit | fahrenheit       | $^{\circ}\mathrm{F}$ |
| DegreesCelsius     | celsius          | °C                   |
| DegreesFahrenheit  | fahrenheit       | $^{\circ}\mathrm{F}$ |
| Dyne               | dyne             | dyn                  |
| Electron Volt      | electronvolt     | eV                   |
| ElectronVolt       | electronvolt     | eV                   |
| Erg                | erg              | erg                  |
| Erlang             | erlang           | E                    |
| Fahrenheit         | fahrenheit       | $^{\circ}\mathrm{F}$ |
| Farad              | farad            | F                    |
| Foot               | foot             | ft                   |
| Gal                | gal              | gal                  |
| Gauss              | gauss            | G                    |
| Gon                | gon              | gon                  |
| Grad               | grad             | grad                 |
| Gram               | gram             | g                    |
| Gray               | gray             | Gy                   |
| Hectare            | hectare          | ha                   |
| Henry              | henry            | H                    |
| Hertz              | hertz            | Hz                   |
| Hg                 | mercury          | Hg                   |
| Hour               | hour             | h                    |
| Inch               | inch             | inch                 |
| Joule              | joule            | J                    |
|                    |                  |                      |

| Katal                                 | katal        | kat  |
|---------------------------------------|--------------|------|
| Kelvin                                | kelvin       | K    |
| Knot                                  | knot         | kn   |
| Liter                                 | liter        | 1    |
| Litre                                 | liter        | 1    |
| Lumen                                 | lumen        | lm   |
| Lux                                   | lux          | lx   |
| Maxwell                               | maxwell      | Mx   |
| Meter                                 | meter        | m    |
| Metre                                 | meter        | m    |
| Metric Ton                            | tonne        | t    |
| MetricTon                             | tonne        | t    |
| Minute                                | minute       | min  |
| Mol                                   | mole         | mol  |
| Mole                                  | mole         | mol  |
| Nautical Mile                         | nauticalmile | M    |
| NauticalMile                          | nauticalmile | M    |
| Neper                                 | neper        | Np   |
| Newton                                | newton       | N    |
| 0ersted                               | oersted      | Oe   |
| Ohm                                   | ohm          | Ω    |
| Pascal                                | pascal       | Pa   |
| Phot                                  | phot         | phot |
| Poise                                 | poise        | P    |
| Radian                                | radian       | rad  |
| Rev                                   | revolution   | rev  |
| Revolution                            | revolution   | rev  |
| Second                                | second       | S    |
| Siemens                               | siemens      | S    |
| Sievert                               | sievert      | Sv   |
| Steradian                             | steradian    | sr   |
| Stilb                                 | stilb        | sb   |
| Stokes                                | stokes       | St   |
| Tesla                                 | tesla        | T    |
| Tonne                                 | tonne        | t    |
| Volt                                  | volt         | V    |
| Watt                                  | watt         | W    |
| Weber                                 | weber        | Wb   |
| basepoint                             | basepoint    | bp   |
| cicero                                | cicero       | cc   |
| didot                                 | didot        | dd   |
| eV                                    | electronvolt | eV   |
| page                                  | page         | page |
| point                                 | point        | pt   |
| scaledpoint                           | scaledpoint  | sp   |
| · · · · · · · · · · · · · · · · · · · | •            |      |

#### shortcuts:operators

\* times .

. times

| / | solidus | / |
|---|---------|---|
| : | outof   | : |

| shortcuts:pre | fixes |       |
|---------------|-------|-------|
| E             | exa   | Е     |
| G             | giga  | G     |
| M             | mega  | M     |
| Р             | peta  | P     |
| T             | tera  | T     |
| Υ             | yotta | Y     |
| Z             | zetta | Z     |
| a             | atto  | a     |
| С             | centi | С     |
| d             | deci  | d     |
| da            | deca  | da    |
| f             | femto | f     |
| h             | hecto | h     |
| k             | kilo  | k     |
| m             | milli | m     |
| n             | nano  | n     |
| p             | pico  | p     |
| u             | micro | μ     |
| у             | yocto | y     |
| z             | zetto | zetto |
|               |       |       |

| shortcuts:suffixe | S          |    |
|-------------------|------------|----|
| +1                | linear     | 1  |
| +2                | square     | 2  |
| +3                | cubic      | 3  |
| +4                | quadratic  | 4  |
| -1                | ilinear    | -1 |
| -2                | isquare    | -2 |
| -3                | icubic     | -3 |
| -4                | iquadratic | -4 |
| 1                 | linear     | 1  |
| 2                 | square     | 2  |
| 3                 | cubic      | 3  |
| 4                 | quadratic  | 4  |
| ^+1               | linear     | 1  |
| ^+2               | square     | 2  |
| ^+3               | cubic      | 3  |
| ^+4               | quadratic  | 4  |
| ^-1               | ilinear    | -1 |
| ^-2               | isquare    | -2 |
| ^-3               | icubic     | -3 |
| ^-4               | iquadratic | -4 |
| ^1                | linear     | 1  |
| ^2                | square     | 2  |
| ^3                | cubic      | 3  |
|                   |            |    |

| ^4              | quadratic  | 4   |
|-----------------|------------|-----|
| shortcuts:units |            |     |
| A               | ampere     | A   |
| В               | bel        | В   |
| Hz              | hertz      | Hz  |
| W               | watt       | W   |
| b               | bel        | В   |
| g               | gram       | g   |
| h               | hour       | h   |
| hz              | hertz      | Hz  |
| l               | liter      | 1   |
| lx              | lux        | lx  |
| m               | meter      | m   |
| min             | minute     | min |
| n               | newton     | N   |
| S               | second     | S   |
| t               | tonne      | t   |
| V               | volt       | V   |
|                 | celsius    | °C  |
|                 | fahrenheit | °F  |

The following units are supported, including some combinations:

| units:operators |                   |      |
|-----------------|-------------------|------|
| OutOf           | outof             | :    |
| Per             | per               | /    |
| Solidus         | solidus           | /    |
| Times           | times             | •    |
| units:packaged  |                   |      |
| Micron          | micron            | μm   |
| mmHg            | millimetermercury | mmHg |
| units:prefixes  |                   |      |
| Atto            | atto              | a    |
| Centi           | centi             | С    |
| Deca            | deca              | da   |
| Deci            | deci              | d    |
| Exa             | exa               | E    |
| Exbi            | exbi              | Ei   |
| Femto           | femto             | f    |
| Gibi            | gibi              | Gi   |
| Giga            | giga              | G    |
| Hecto           | hecto             | h    |
| Kibi            | kibi              | Ki   |
| Kilo            | kilo              | k    |
| Mebi            | mebi              | Mi   |
| Mega            | mega              | M    |
|                 |                   |      |

| Micro   | micro  | μ                                       |
|---|--|---|
| Milli   | milli  | m                                       |
| Nano  | nano   | n                                       |
| Pebi  | pebi   | Pi                                      |
| Peta  | peta   | P                                       |
| Pico  | pico   | р                                       |
| Root  | root   | <b>P</b> √                              |
| Tebi  | tebi   | v<br>Ti                                 |
| Tera  | tera   | T                                       |
| Yobi  | yobi   | Yi                                      |
| Yocto   | -  |   |
|   | yocto  | y<br>Y                                  |
| Yotta   | yotta  |   |
| Zebi  | zebi   | Zi                                      |
| Zepto   | zepto  | Z                                       |
| Zetta   | zetta  | Z                                       |
|   |  |   |
| units:suffixes  |  |   |
| Cubic   | cubic  | 3                                       |
| ICubic  | icubic   | -3                                      |
| ILinear   | ilinear  | -1                                      |
| IQuadratic  | iquadratic   | -4                                      |
| ISquare   | isquare  | -2                                      |
| Inverse   | inverse  | -1                                      |
| Linear  | linear   | 1                                       |
| Quadratic   | quadratic  | 4                                       |
| Quadracic   | quadracic  | -                                       |
| Square  | sauare   | 2                                       |
| Square  | square   | 2                                       |
| Square units:symbols  | square   |   |
|   |  |   |
| units:symbols   | percent  | %,                                      |
| units:symbols ArcMinute   | percent<br>arcminute   | %                                       |
| units:symbols  ArcMinute ArcSecond  | percent<br>arcminute<br>arcsecond  | %,                                      |
| units:symbols  ArcMinute ArcSecond Degree   | percent<br>arcminute<br>arcsecond<br>degree  | % , , ,                                 |
| units:symbols  ArcMinute ArcSecond Degree Degrees   | percent arcminute arcsecond degree degree  | % , , , , , , , , , , , , , , , , , , , |
| units:symbols  ArcMinute ArcSecond Degree Degrees Percent   | percent arcminute arcsecond degree degree percent  | %<br>,<br>,<br>,<br>,<br>,              |
| units:symbols  ArcMinute ArcSecond Degree Degrees Percent Permille  | percent arcminute arcsecond degree degree percent permille   | %<br>,<br>,<br>,<br>,<br>,<br>,<br>,    |
| units:symbols  ArcMinute ArcSecond Degree Degrees Percent   | percent arcminute arcsecond degree degree percent permille permille  | %<br>,<br>,<br>,<br>,<br>,              |
| units:symbols  ArcMinute ArcSecond Degree Degrees Percent Permille  | percent arcminute arcsecond degree degree percent permille permille degree   | %                                       |
| units:symbols  ArcMinute ArcSecond Degree Degrees Percent Permille  | percent arcminute arcsecond degree degree percent permille permille degree arcminute   | % , , , % % % , , , , , ,               |
| units:symbols  ArcMinute ArcSecond Degree Degrees Percent Permille  | percent arcminute arcsecond degree degree percent permille permille degree   | %                                       |
| units:symbols  ArcMinute ArcSecond Degree Degrees Percent Permille  | percent arcminute arcsecond degree degree percent permille permille degree arcminute   | % , , , % % % , , , , , ,               |
| units:symbols  ArcMinute ArcSecond Degree Degrees Percent Permille Promille o   | percent arcminute arcsecond degree degree percent permille permille degree arcminute arcsecond   | % , , , % % % , , , , , , , , , , , , , |
| units:symbols  ArcMinute ArcSecond Degree Degrees Percent Permille Promille o / / // units:units AMU  | percent arcminute arcsecond degree degree percent permille permille degree arcminute arcsecond   | % % . %                                 |
| units:symbols  ArcMinute ArcSecond Degree Degrees Percent Permille Promille o  Mu Ampere  | percent arcminute arcsecond degree degree percent permille permille degree arcminute arcsecond  atomicmassunit ampere  | % , , , % % % % , , , , , , , u A       |
| units:symbols  ArcMinute ArcSecond Degree Degrees Percent Permille Promille o / / //  units:units  AMU Ampere Angstrom                                    | percent arcminute arcsecond degree degree percent permille permille degree arcminute arcsecond  atomicmassunit ampere angstrom                                   | % , , , % % % % , , , , , , , , , , , , |
| units:symbols  ArcMinute ArcSecond Degree Degrees Percent Permille Promille o / / // // units:units  AMU Ampere Angstrom Astronomical Unit                | percent arcminute arcsecond degree degree percent permille permille degree arcminute arcsecond  atomicmassunit ampere angstrom astronomicalunit                  | %, , , % % % % , , , ,  u A Å au        |
| units:symbols  ArcMinute ArcSecond Degree Degrees Percent Permille Promille o / / //  units:units  AMU Ampere Angstrom Astronomical Unit AstronomicalUnit | percent arcminute arcsecond degree degree percent permille permille degree arcminute arcsecond  atomicmassunit ampere angstrom astronomicalunit astronomicalunit | %, , , % % % % , , , , , , , , , , , ,  |
| units:symbols  ArcMinute ArcSecond Degree Degrees Percent Permille Promille  ,  ,  Mu Ampere Angstrom Astronomical Unit AstronomicalUnit Atm              | percent arcminute arcsecond degree degree percent permille permille degree arcminute arcsecond  atomicmassunit ampere angstrom astronomicalunit atmosphere       | %  % % % % %  %  u A A au au atm        |
| units:symbols  ArcMinute ArcSecond Degree Degrees Percent Permille Promille o / / //  units:units  AMU Ampere Angstrom Astronomical Unit AstronomicalUnit | percent arcminute arcsecond degree degree percent permille permille degree arcminute arcsecond  atomicmassunit ampere angstrom astronomicalunit astronomicalunit | %, , , % % % % , , , , , , , , , , , ,  |

| AtomicMassUnit     | atomicmassunit  | 11       |
|--------------------|-----------------|----------|
| Bar                | atomicmassunit  | u<br>bar |
| -                  | bar             |          |
| Barn<br>Baud       | barn<br>baud    | b<br>Bd  |
| Bel                | bauu<br>bel     |          |
|                    |                 | В        |
| Bequerel           | bequerel        | Bq       |
| Bit                | bit             | bit      |
| Byte<br>Cal        | byte<br>calorie | B        |
|                    |                 | cal      |
| Calorie            | calorie         | cal      |
| Candela            | candela         | cd       |
| Celsius            | celsius         | °C       |
| Coulomb            | coulomb         | С        |
| Dalton             | dalton          | Da       |
| Day                | day             | d        |
| Degree Celsius     | celsius         | °C       |
| Degree Fahrenheit  | fahrenheit      | °F       |
| DegreeCelsius      | celsius         | °C       |
| DegreeFahrenheit   | fahrenheit      | °F       |
| Degrees Celsius    | celsius         | °C       |
| Degrees Fahrenheit |                 | °F       |
| DegreesCelsius     | celsius         | °C       |
| DegreesFahrenheit  | fahrenheit      | °F       |
| Dyne               | dyne            | dyn      |
| Electron Volt      | electronvolt    | eV       |
| ElectronVolt       | electronvolt    | eV       |
| Erg                | erg             | erg      |
| Erlang             | erlang          | E        |
| Fahrenheit         | fahrenheit      | °F       |
| Farad              | farad           | F        |
| Foot               | foot            | ft       |
| Gal                | gal             | gal      |
| Gauss              | gauss           | G        |
| Gon                | gon             | gon      |
| Grad               | grad            | grad     |
| Gram               | gram            | g        |
| Gray               | gray            | Gy       |
| Hectare            | hectare         | ha       |
| Henry              | henry           | Н        |
| Hertz              | hertz           | Hz       |
| Hg                 | mercury         | Hg       |
| Hour               | hour            | h        |
| Inch               | inch            | inch     |
| Joule              | joule           | J        |
| Katal              | katal           | kat      |
| Kelvin             | kelvin          | K        |
| Knot               | knot            | kn       |
| Liter              | liter           | 1        |
| Litre              | liter           | 1        |
|                    |                 |          |

E

| Lumen               | lumen        | lm   |  |
|---------------------|--------------|------|--|
| Lux                 | lux          | lx   |  |
| Maxwell             | maxwell      | Mx   |  |
| Meter               | meter        | m    |  |
| Metre               | meter        | m    |  |
| Metric Ton          | tonne        | t    |  |
| MetricTon           | tonne        | t    |  |
| Minute              | minute       | min  |  |
| Mol                 | mole         | mol  |  |
| Mole                | mole         | mol  |  |
| Nautical Mile       | nauticalmile | M    |  |
| NauticalMile        | nauticalmile | M    |  |
| Neper               | neper        | Np   |  |
| Newton              | newton       | N    |  |
| 0ersted             | oersted      | Oe   |  |
| Ohm                 | ohm          | Ω    |  |
| Pascal              | pascal       | Pa   |  |
| Phot                | phot         | phot |  |
| Poise               | poise        | Р    |  |
| Radian              | radian       | rad  |  |
| Rev                 | revolution   | rev  |  |
| Revolution          | revolution   | rev  |  |
| Second              | second       | S    |  |
| Siemens             | siemens      | S    |  |
| Sievert             | sievert      | Sv   |  |
| Steradian           | steradian    | sr   |  |
| Stilb               | stilb        | sb   |  |
| Stokes              | stokes       | St   |  |
| Tesla               | tesla        | T    |  |
| Tonne               | tonne        | t    |  |
| Volt                | volt         | V    |  |
| Watt                | watt         | W    |  |
| Weber               | weber        | Wb   |  |
| basepoint           | basepoint    | bp   |  |
| cicero              | cicero       | CC   |  |
| didot               | didot        | dd   |  |
| eV                  | electronvolt | eV   |  |
| page                | page         | page |  |
| point               | point        | pt   |  |
| scaledpoint         | scaledpoint  | sp   |  |
| shortcuts:operators |              |      |  |
| *                   | times        | •    |  |
|                     | times        |      |  |
| /                   | solidus      | /    |  |
| :                   | outof        | :    |  |
|                     |              |      |  |
| shortcuts:prefixes  |              |      |  |

exa

E

| G                  | giga       | G     |
|--------------------|------------|-------|
| M                  | mega       | M     |
| Р                  | peta       | P     |
| Т                  | tera       | T     |
| Υ                  | yotta      | Y     |
| Z                  | zetta      | Z     |
| a                  | atto       | a     |
| С                  | centi      | С     |
| d                  | deci       | d     |
| da                 | deca       | da    |
| f                  | femto      | f     |
| h                  | hecto      | h     |
| k                  | kilo       | k     |
| m                  | milli      | m     |
| n                  | nano       | n     |
| p                  | pico       | p     |
| u                  | micro      | μ     |
| у                  | yocto      | y     |
| y<br>Z             | zetto      | zetto |
|                    | 2000       |       |
| shortcuts:suffixes |            |       |
| +1                 | linear     | 1     |
| +2                 | square     | 2     |
| +3                 | cubic      | 3     |
| +4                 | quadratic  | 4     |
| -1                 | ilinear    | -1    |
| -2                 | isquare    | -2    |
| -3                 | icubic     | -3    |
| - 4                | iquadratic | -4    |
| 1                  | linear     | 1     |
| 2                  | square     | 2     |
| 3                  | cubic      | 3     |
| 4                  | quadratic  | 4     |
| ^+1                | linear     | 1     |
| ^+2                | square     | 2     |
| ^+3                | cubic      | 3     |
| ^+4                | quadratic  | 4     |
| ^-1                | ilinear    | -1    |
| ^-2                | isquare    | -2    |
| ^-3                | icubic     | -3    |
| ^-4                | iquadratic | -4    |
| ^1                 | linear     | 1     |
| ^2                 | square     | 2     |
| ^3                 | cubic      | 3     |
| ^4                 | quadratic  | 4     |
|                    |            |       |
| shortcuts:units    |            |       |
| A                  | ampere     | A     |
| В                  | bel        | В     |

| Hz  | hertz      | Hz  |
|-----|------------|-----|
| W   | watt       | W   |
| b   | bel        | В   |
| g   | gram       | g   |
| h   | hour       | h   |
| hz  | hertz      | Hz  |
| l   | liter      | l   |
| lx  | lux        | lx  |
| m   | meter      | m   |
| min | minute     | min |
| n   | newton     | N   |
| S   | second     | S   |
| t   | tonne      | t   |
| V   | volt       | V   |
|     | celsius    | °C  |
|     | fahrenheit | °F  |
|     |            |     |

The amount of operators is small:

| outof   | :                       |
|---------|-------------------------|
| per     | 1                       |
| solidus | 1                       |
| times   |                         |
|         | outof<br>per<br>solidus |

| units:packaged |                   |      |
|----------------|-------------------|------|
| Micron         | micron            | μm   |
| mmHg           | millimetermercury | mmHg |

| millimetermercury | mmHg  |
|-------------------|---|
| ·                 |   |
|                   |   |
| atto              | a   |
| centi             | С   |
| deca              | da  |
| deci              | d   |
| exa               | E   |
| exbi              | Ei  |
| femto             | f   |
| gibi              | Gi  |
| giga              | G   |
| hecto             | h   |
| kibi              | Ki  |
| kilo              | k   |
| mebi              | Mi  |
| mega              | M   |
| micro             | μ   |
| milli             | m   |
| nano              | n   |
| pebi              | Pi  |
| peta              | P   |
|                   | atto centi deca deci exa exbi femto gibi giga hecto kibi kilo mebi mega micro milli nano pebi |

| Pico              | pico             | p         |
|-------------------|------------------|-----------|
| Root              | root             | $\sqrt{}$ |
| Tebi              | tebi             | Ti        |
| Tera              | tera             | T         |
| Yobi              | yobi             | Yi        |
| Yocto             | yocto            | y         |
| Yotta             | yotta            | Y         |
| Zebi              | zebi             | Zi        |
| Zepto             | zepto            | Z         |
| Zetta             | zetta            | Z         |
| units:suffixes    |                  |           |
| Cubic             | cubic            | 3         |
| ICubic            | icubic           | -3        |
| ILinear           | ilinear          | -1        |
| IQuadratic        | iquadratic       | -4        |
| ISquare           | isquare          | -2        |
| Inverse           | inverse          | -1        |
| Linear            | linear           | 1         |
| Quadratic         | quadratic        | 4         |
| Square            | square           | 2         |
|                   | - Square         |           |
| units:symbols     |                  |           |
|                   | percent          | %         |
| ArcMinute         | arcminute        | ,         |
| ArcSecond         | arcsecond        | "         |
| Degree            | degree           | ٥         |
| Degrees           | degree           | ٥         |
| Percent           | percent          | %         |
| Permille          | permille         | ‰         |
| Promille          | permille         | ‰         |
| 0                 | degree           | o         |
| ,                 | arcminute        | ,         |
| "                 | arcsecond        | "         |
|                   |                  |           |
| units:units       |                  |           |
| AMU               | atomicmassunit   | u         |
| Ampere            | ampere           | A         |
| Angstrom          | angstrom         | Å         |
| Astronomical Unit | astronomicalunit | au        |
| AstronomicalUnit  | astronomicalunit | au        |
| Atm               | atmosphere       | atm       |
| Atmosphere        | atmosphere       | atm       |
| Atomic Mass Unit  | atomicmassunit   | u         |
| AtomicMassUnit    | atomicmassunit   | u         |
| Bar               | bar              | bar       |
| Barn              | barn             | b         |
| Baud              | baud             | Bd        |
| Bel               | bel              | В         |
|                   |                  |           |

| _                   |              | _    |
|---------------------|--------------|------|
| Bequerel            | bequerel     | Bq   |
| Bit                 | bit          | bit  |
| Byte                | byte         | В    |
| Cal                 | calorie      | cal  |
| Calorie             | calorie      | cal  |
| Candela             | candela      | cd   |
| Celsius             | celsius      | °C   |
| Coulomb             | coulomb      | С    |
| Dalton              | dalton       | Da   |
| Day                 | day          | d    |
| Degree Celsius      | celsius      | °C   |
| Degree Fahrenheit   | fahrenheit   | °F   |
| DegreeCelsius       | celsius      | °C   |
| DegreeFahrenheit    | fahrenheit   | °F   |
| Degrees Celsius     | celsius      | °C   |
| Degrees Fahrenheit  | fahrenheit   | °F   |
| DegreesCelsius      | celsius      | °C   |
| DegreesFahrenheit   | fahrenheit   | °F   |
| Dyne                | dyne         | dyn  |
| Electron Volt       | electronvolt | eV   |
| ElectronVolt        | electronvolt | eV   |
| Erg                 | erg          | erg  |
| Erlang              | erlang       | E    |
| Fahrenheit          | fahrenheit   | °F   |
| Farad               | farad        | F    |
| Foot                | foot         | ft   |
| Gal                 | gal          | gal  |
| Gauss               | gauss        | G    |
| Gon                 | gon          | gon  |
| Grad                | grad         | grad |
| Gram                | gram         | g    |
| Gray                | gray         | Gy   |
| Hectare             | hectare      | ha   |
| Henry               | henry        | H    |
| Hertz               | hertz        | Hz   |
| Hg                  | mercury      | Hg   |
| Hour                | hour         | h    |
| Inch                | inch         | inch |
| Joule               | joule        | J    |
| Katal               | katal        | kat  |
| Kelvin              | kelvin       | K    |
| Knot                | knot         | kn   |
| Liter               | liter        | 1    |
| Litre               | liter        | 1    |
| Lumen               | lumen        | lm   |
| Lux                 | lux          | lx   |
| Maxwell             | maxwell      | Mx   |
| Meter               | meter        | m    |
| Metre               | meter        | m    |
| - ·· · <del>-</del> |              |      |

| Metric Ton       | tonne        | t    |
|------------------|--------------|------|
| MetricTon        | tonne        | t    |
| Minute           | minute       | min  |
| Mol              | mole         | mol  |
| Mole             | mole         | mol  |
| Nautical Mile    | nauticalmile | M    |
| NauticalMile<br> | nauticalmile | M    |
| Neper            | neper        | Np   |
| Newton           | newton       | N    |
| 0ersted          | oersted      | Oe   |
| Ohm              | ohm          | Ω    |
| Pascal           | pascal       | Pa   |
| Phot             | phot         | phot |
| Poise            | poise        | P    |
| Radian           | radian       | rad  |
| Rev              | revolution   | rev  |
| Revolution       | revolution   | rev  |
| Second           | second       | S    |
| Siemens          | siemens      | S    |
| Sievert          | sievert      | Sv   |
| Steradian        | steradian    | sr   |
| Stilb            | stilb        | sb   |
| Stokes           | stokes       | St   |
| Tesla            | tesla        | T    |
| Tonne            | tonne        | t    |
| Volt             | volt         | V    |
| Watt             | watt         | W    |
| Weber            | weber        | Wb   |
| basepoint        | basepoint    | bp   |
| cicero           | cicero       | CC   |
| didot            | didot        | dd   |
| eV               | electronvolt | eV   |
| page             | page         | page |
| point            | point        | pt   |
| scaledpoint      | scaledpoint  | sp   |
| shortcuts:operat | ors          |      |
| *                | times        |      |
|                  | times        |      |
| /                | solidus      | /    |
| :                | outof        | :    |
| shortcuts:prefix | es           |      |
| E                | exa          |      |
| G                | giga         | G    |
| M                | mega         | M    |
| P                | peta         | P    |
| T                | tera         | T    |
| Y                | yotta        | Y    |
| 1                | yotta        | 1    |

| Z                 | zetta      | Z     |
|-------------------|------------|-------|
| a                 | atto       | a     |
| С                 | centi      | С     |
| d                 | deci       | d     |
| da                | deca       | da    |
| f                 | femto      | f     |
| h                 | hecto      | h     |
| k                 | kilo       | k     |
| m                 | milli      | m     |
| n                 | nano       | n     |
| р                 | pico       | p     |
| u<br>u            | micro      | μ     |
| у                 | yocto      | y     |
| Z                 | zetto      | zetto |
|                   |            |       |
| shortcuts:suffixe | es         |       |
| +1                | linear     | 1     |
| +2                | square     | 2     |
| +3                | cubic      | 3     |
| +4                | quadratic  | 4     |
| -1                | ilinear    | -1    |
| -2                | isquare    | -2    |
| -3                | icubic     | -3    |
| - 4               | iquadratic | -4    |
| 1                 | linear     | 1     |
| 2                 | square     | 2     |
| 3                 | cubic      | 3     |
| 4                 | quadratic  | 4     |
| ^+1               | linear     | 1     |
| ^+2               | square     | 2     |
| ^+3               | cubic      | 3     |
| ^+4               | quadratic  | 4     |
| ^-1               | ilinear    | -1    |
| ^-2               | isquare    | -2    |
| ^-3               | icubic     | -3    |
| ^-4               | iquadratic | -4    |
| ^1                | linear     | 1     |
| ^2                | square     | 2     |
| ^3                | cubic      | 3     |
| ^4                | quadratic  | 4     |
|                   |            |       |
| shortcuts:units   |            |       |
| Α                 | ampere     | A     |
| В                 | bel        | В     |
| Hz                | hertz      | Hz    |
| W                 | watt       | W     |
| b                 | bel        | В     |
| g                 | gram       | g     |
| h                 | hour       | h     |
|                   |            |       |

| hz  | hertz      | Hz  |
|-----|------------|-----|
| l   | liter      | 1   |
| lx  | lux        | lx  |
| m   | meter      | m   |
| min | minute     | min |
| n   | newton     | N   |
| S   | second     | S   |
| t   | tonne      | t   |
| V   | volt       | V   |
|     | celsius    | °C  |
|     | fahrenheit | °F  |

There is also a small set of (names) suffixes:

| units:operators |                   |      |
|-----------------|-------------------|------|
| OutOf           | outof             | :    |
| Per             | per               | /    |
| Solidus         | solidus           | /    |
| Times           | times             | •    |
| units:packaged  |                   |      |
| Micron          | micron            | μm   |
| mmHg            | millimetermercury | mmHg |
| units:prefixes  |                   |      |
| Atto            | atto              | a    |

| units:prefixes |       |              |
|----------------|-------|--------------|
| Atto           | atto  | a            |
| Centi          | centi | С            |
| Deca           | deca  | da           |
| Deci           | deci  | d            |
| Exa            | exa   | E            |
| Exbi           | exbi  | Ei           |
| Femto          | femto | f            |
| Gibi           | gibi  | Gi           |
| Giga           | giga  | G            |
| Hecto          | hecto | h            |
| Kibi           | kibi  | Ki           |
| Kilo           | kilo  | k            |
| Mebi           | mebi  | Mi           |
| Mega           | mega  | M            |
| Micro          | micro | μ            |
| Milli          | milli | m            |
| Nano           | nano  | n            |
| Pebi           | pebi  | Pi           |
| Peta           | peta  | P            |
| Pico           | pico  | p            |
| Root           | root  | $\checkmark$ |
| Tebi           | tebi  | Ti           |
| Tera           | tera  | T            |
| Yobi           | yobi  | Yi           |
|                |       |              |

| Yocto               | yocto                | y      |
|---------------------|----------------------|--------|
| Yotta               | yotta                | Y      |
| Zebi                | zebi                 | Zi     |
| Zepto               | zepto                | Z      |
| Zetta               | zetta                | Z      |
| units:suffixes      |                      |        |
| Cubic               | cubic                | 3      |
| ICubic              | icubic               | -3     |
| ILinear             | ilinear              | -1     |
| IQuadratic          | iquadratic           | -4     |
| ISquare             | isquare              | -2     |
| Inverse             | inverse              | -1     |
| Linear              | linear               | 1      |
| Quadratic           | quadratic            | 4      |
| Square              | square               | 2      |
| units:symbols       |                      |        |
| units.symbots       |                      | 0/     |
| ArcMinuto           | percent<br>arcminute | %      |
| ArcMinute ArcSecond |                      | "      |
|                     | arcsecond            | 0      |
| Degree              | degree               | 0      |
| Degrees             | degree               |        |
| Percent<br>Permille | percent              | %<br>‰ |
|                     | permille             |        |
| Promille            | permille             | %      |
| ,                   | degree               | ,      |
| "                   | arcminute            | "      |
|                     | arcsecond            |        |
| units:units         |                      |        |
| AMU                 | atomicmassunit       | u      |
| Ampere              | ampere               | A      |
| Angstrom            | angstrom             | Å      |
| Astronomical Unit   | astronomicalunit     | au     |
| AstronomicalUnit    | astronomicalunit     | au     |
| Atm                 | atmosphere           | atm    |
| Atmosphere          | atmosphere           | atm    |
| Atomic Mass Unit    | atomicmassunit       | u      |
| AtomicMassUnit      | atomicmassunit       | u      |
| Bar                 | bar                  | bar    |
| Barn                | barn                 | b      |
| Baud                | baud                 | Bd     |
| Bel                 | bel                  | В      |
| Bequerel            | bequerel             | Bq     |
| Bit                 | bit                  | bit    |
| Byte                | byte                 | В      |
| Cal                 | calorie              | cal    |
| Calorie             | calorie              | cal    |

| Candela            | candela      | cd        |
|--------------------|--------------|-----------|
| Celsius            | celsius      | °C        |
| Coulomb            | coulomb      | С         |
| Dalton             | dalton       | Da        |
| Day                | day          | d         |
| Degree Celsius     | celsius      | °C        |
| Degree Fahrenheit  | fahrenheit   | °F        |
| DegreeCelsius      | celsius      | °C        |
| DegreeFahrenheit   | fahrenheit   | °F        |
| Degrees Celsius    | celsius      | °C        |
| Degrees Fahrenheit | fahrenheit   | °F        |
| DegreesCelsius     | celsius      | °C        |
| DegreesFahrenheit  | fahrenheit   | °F        |
| Dyne               | dyne         | dyn       |
| Electron Volt      | electronvolt | ${ m eV}$ |
| ElectronVolt       | electronvolt | eV        |
| Erg                | erg          | erg       |
| Erlang             | erlang       | E         |
| Fahrenheit         | fahrenheit   | °F        |
| Farad              | farad        | F         |
| Foot               | foot         | ft        |
| Gal                | gal          | gal       |
| Gauss              | gauss        | G         |
| Gon                | gon          | gon       |
| Grad               | grad         | grad      |
| Gram               | gram         | g         |
| Gray               | gray         | Gy        |
| Hectare            | hectare      | ha        |
| Henry              | henry        | Н         |
| Hertz              | hertz        | Hz        |
| Hg                 | mercury      | Hg        |
| Hour               | hour         | h         |
| Inch               | inch         | inch      |
| Joule              | joule        | J         |
| Katal              | katal        | kat       |
| Kelvin             | kelvin       | K         |
| Knot               | knot         | kn        |
| Liter              | liter        | 1         |
| Litre              | liter        | l         |
| Lumen              | lumen        | lm        |
| Lux                | lux          | lx        |
| Maxwell            | maxwell      | Mx        |
| Meter              | meter        | m         |
| Metre              | meter        |           |
| Metric Ton         | tonne        | m<br>t    |
| MetricTon          | tonne        | t         |
| Minute             | minute       | ւ<br>min  |
| Mol                | mole         | mol       |
|                    |              |           |
| Mole               | mole         | mol       |

| Nautical Mile      | nauticalmile       | M        |
|--------------------|--------------------|----------|
| NauticalMile       | nauticalmile       | M        |
| Neper              | neper              | Np       |
| Newton             | newton             | N        |
| 0ersted            | oersted            | Oe       |
| Ohm                | ohm                | Ω        |
| Pascal             | pascal             | Pa       |
| Phot               | phot               | phot     |
| Poise              | poise              | P        |
| Radian             | radian             | rad      |
| Rev                | revolution         | rev      |
| Revolution         | revolution         | rev      |
| Second             | second             | S        |
| Siemens            | siemens            | S        |
| Sievert            | sievert            | Sv       |
| Steradian<br>Stilb | steradian<br>stilb | sr<br>sb |
| Stokes             | stokes             | St       |
| Tesla              | tesla              | Si<br>T  |
| Tonne              | tonne              | t        |
| Volt               | volt               | ι<br>V   |
| Watt               | watt               | W        |
| Weber              | weber              | Wb       |
| basepoint          | basepoint          | bp       |
| cicero             | cicero             | CC       |
| didot              | didot              | dd       |
| eV                 | electronvolt       | eV       |
| page               | page               | page     |
| point              | point              | pt       |
| scaledpoint        | scaledpoint        | sp       |
|                    |                    |          |
| shortcuts:operate  | ors                |          |
| *                  | times              | •        |
| •                  | times              | •        |
| /                  | solidus            | /        |
| :                  | outof              | :        |
| shortcuts:prefix   | es                 |          |
| E                  | exa                | Е        |
| G                  | giga               | G        |
| М                  | mega               | M        |
| P                  | peta               | P        |
| T                  | tera               | T        |
| Υ                  | yotta              | Y        |
| Z                  | zetta              | Z        |
| a                  | atto               | a        |
| С                  | centi              | С        |
| d                  | deci               | d        |
| da                 | deca               | da       |
|                    |                    |          |

|                    |            | 26        |
|--------------------|------------|-----------|
|                    |            |           |
| _                  |            | 2         |
| f                  | femto      | f         |
| h                  | hecto      | h         |
| k                  | kilo       | k         |
| m                  | milli      | m         |
| n                  | nano       | n         |
| p                  | pico       | p         |
| u                  | micro      | μ         |
| У                  | yocto      | y         |
| Z                  | zetto      | zetto     |
| shortcuts:suffixes | 5          |           |
| +1                 | linear     | 1         |
| +2                 | square     | 2         |
| +3                 | cubic      | 3         |
| +4                 | quadratic  | 4         |
| -1                 | ilinear    | -1        |
| -2                 | isquare    | -2        |
| -3                 | icubic     | -3        |
| -4                 | iquadratic | -4        |
| 1                  | linear     | 1         |
| 2                  | square     | 2         |
| 3                  | cubic      | 3         |
| 4                  | quadratic  | 4         |
| ^+1                | linear     | 1         |
| ^+2                | square     | 2         |
| ^+3                | cubic      | 3         |
| ^+4                | quadratic  | 4         |
| ^-1                | ilinear    | <b>-1</b> |
| ^-2                | isquare    | -1 $-2$   |
| ^-3                | icubic     | -2<br>-3  |
| -3<br>^-4          |            |           |
| ^1                 | iquadratic | -4<br>1   |
|                    | linear     | 1         |
| ^2                 | square     | 2         |
| ^3                 | cubic      | 3         |
| ^4                 | quadratic  | 4         |

| shortcuts:units |        |     |
|-----------------|--------|-----|
| A               | ampere | A   |
| В               | bel    | В   |
| Hz              | hertz  | Hz  |
| W               | watt   | W   |
| b               | bel    | В   |
| g               | gram   | g   |
| h               | hour   | h   |
| hz              | hertz  | Hz  |
| l               | liter  | 1   |
| lx              | lux    | lx  |
| m               | meter  | m   |
| min             | minute | min |

| n | newton     | N  |
|---|------------|----|
| S | second     | S  |
| t | tonne      | t  |
| V | volt       | V  |
|   | celsius    | °C |
|   | fahrenheit | °F |
|   |            |    |

|                    | celsius            | °C   |
|--------------------|--------------------|------|
|                    | fahrenheit         | °F   |
| Some symbols get a | special treatment: |      |
| units:operators    |                    |      |
| OutOf              | outof              | :    |
| Per                | per                | /    |
| Solidus            | solidus            | /    |
| Times              | times              | •    |
| units:packaged     |                    |      |
| Micron             | micron             | μm   |
| mmHg               | millimetermercury  | mmHg |
| units:prefixes     |                    |      |
| Atto               | atto               | a    |
| Centi              | centi              | C    |
| Deca               | deca               | da   |
| Deci               | deci               | d    |
| Exa                | exa                | E    |
| Exbi               | exbi               | Ei   |
| Femto              | femto              | f    |
| Gibi               | gibi               | Gi   |
| Giga               | giga               | G    |
| Hecto              | hecto              | h    |
| Kibi               | kibi               | Ki   |
| Kilo               | kilo               | k    |
| Mebi               | mebi               | Mi   |
| Mega               | mega               | M    |
| Micro              | micro              | μ    |
| Milli              | milli              | m    |
| Nano               | nano               | n    |
| Pebi               | pebi               | Pi   |
|                    |                    | _    |

peta

pico

root

tebi

tera

yobi

yocto

yotta

zebi

zepto

zetta

P

**p** √

Ti

T

Yi

y

Y

Zi

z Z

Peta

Pico

Root

Tebi

Tera

Yobi

Yocto

Yotta

Zepto

Zetta

Zebi

| units:suffixes    |                  |                     |
|-------------------|------------------|---------------------|
| Cubic             | cubic            | 3                   |
| ICubic            | icubic           | -3                  |
| ILinear           | ilinear          | -1                  |
| IQuadratic        | iquadratic       | -4                  |
| ISquare           | isquare          | -2                  |
| Inverse           | inverse          | _<br>_1             |
| Linear            | linear           | 1                   |
| Quadratic         | quadratic        | 4                   |
| Square            | square           | 2                   |
|                   |                  |                     |
| units:symbols     |                  |                     |
|                   | percent          | %                   |
| ArcMinute         | arcminute        | ,                   |
| ArcSecond         | arcsecond        | "                   |
| Degree            | degree           | 0                   |
| Degrees           | degree           | 0                   |
| Percent           | percent          | %                   |
| Permille          | permille         | ‰                   |
| Promille          | permille         | ‰                   |
| 0                 | degree           | 0                   |
| ,                 | arcminute        | ,                   |
| <i>"</i>          | arcsecond        | "                   |
| units:units       |                  |                     |
| AMU               | atomicmassunit   | u                   |
| Ampere            | ampere           | A                   |
| Angstrom          | angstrom         | Å                   |
| Astronomical Unit | astronomicalunit | au                  |
| AstronomicalUnit  | astronomicalunit | au                  |
| Atm               | atmosphere       | atm                 |
| Atmosphere        | atmosphere       | atm                 |
| Atomic Mass Unit  | atomicmassunit   | u                   |
| AtomicMassUnit    | atomicmassunit   | u                   |
| Bar               | bar              | bar                 |
| Barn              | barn             | b                   |
| Baud              | baud             | Bd                  |
| Bel               | bel              | В                   |
| Bequerel          | bequerel         | Bq                  |
| Bit               | bit              | bit                 |
| Byte              | byte             | В                   |
| Cal               | calorie          | cal                 |
| Calorie           | calorie          | cal                 |
| Candela           | candela          | $\operatorname{cd}$ |
| Celsius           | celsius          | °C                  |
| Coulomb           | coulomb          | C                   |
| Dalton            | dalton           | Da                  |
| -                 | -                |                     |

| Day                | day          | d             |
|--------------------|--------------|---------------|
| Degree Celsius     | celsius      | °C            |
| Degree Fahrenheit  | fahrenheit   | °F            |
| DegreeCelsius      | celsius      | °C            |
| DegreeFahrenheit   | fahrenheit   | °F            |
| Degrees Celsius    | celsius      | °C            |
| Degrees Fahrenheit | fahrenheit   | °F            |
| DegreesCelsius     | celsius      | °C            |
| DegreesFahrenheit  | fahrenheit   | °F            |
| Dyne               | dyne         | dyn           |
| Electron Volt      | electronvolt | $\mathrm{eV}$ |
| ElectronVolt       | electronvolt | $\mathrm{eV}$ |
| Erg                | erg          | erg           |
| Erlang             | erlang       | E             |
| Fahrenheit         | fahrenheit   | °F            |
| Farad              | farad        | F             |
| Foot               | foot         | ft            |
| Gal                | gal          | gal           |
| Gauss              | gauss        | G             |
| Gon                | gon          | gon           |
| Grad               | grad         | grad          |
| Gram               | gram         | g             |
| Gray               | gray         | Gy            |
| Hectare            | hectare      | ha            |
| Henry              | henry        | Н             |
| Hertz              | hertz        | Hz            |
| Hg                 | mercury      | Hg            |
| Hour               | hour         | h             |
| Inch               | inch         | inch          |
| Joule              | joule        | J             |
| Katal              | katal        | kat           |
| Kelvin             | kelvin       | K             |
| Knot               | knot         | kn            |
| Liter              | liter        | 1             |
| Litre              | liter        | 1             |
| Lumen              | lumen        | lm            |
| Lux                | lux          | lx            |
| Maxwell            | maxwell      | Mx            |
| Meter              | meter        | m             |
| Metre              | meter        | m             |
| Metric Ton         | tonne        | t             |
| MetricTon          | tonne        | t             |
| Minute             | minute       | min           |
| Mol                | mole         | mol           |
| Mole               | mole         | mol           |
| Nautical Mile      | nauticalmile | M             |
| NauticalMile       | nauticalmile | M             |
| Neper              | neper        | Np            |
| Newton             | •            | N<br>N        |
| NEWLUII            | newton       | 1N            |

| 0ersted   | oersted   | Oe   |
|---|---|--|
| Ohm   | ohm   | Ω  |
| Pascal  | pascal  | Pa   |
| Phot  | phot  | phot   |
| Poise   | poise   | P  |
| Radian  | radian  | rad  |
| Rev   | revolution  | rev  |
| Revolution  | revolution  | rev  |
| Second  | second  | S  |
| Siemens   | siemens   | S  |
| Sievert   | sievert   | Sv   |
| Steradian   | steradian   | sr   |
| Stilb   | stilb   | sb   |
| Stokes  | stokes  | St   |
| Tesla   | tesla   | T  |
| Tonne   | tonne   | t  |
| Volt  | volt  | V  |
| Watt  | watt  | W  |
| Weber   | weber   | Wb   |
| basepoint   | basepoint   | bp   |
| cicero  | cicero  | CC   |
| didot   | didot   | dd   |
| eV  | electronvolt  | eV   |
| page  | page  | page   |
| point   | point   | pt   |
| scaladnoin+   | ccalodnoint   | 0.70   |
| scaledpoint   | scaledpoint   | sp   |
| shortcuts:operators   |   | sp   |
|   |   | sp   |
| shortcuts:operators   | ;   | sp   |
| shortcuts:operators   | times   | sp   |
| shortcuts:operators   | times<br>times  |  |
| shortcuts:operators * . /   | times<br>times<br>solidus   | ·<br>·<br>/  |
| shortcuts:operators * . / : shortcuts:prefixes                              | times<br>times<br>solidus<br>outof  | ·<br>·<br>/<br>:   |
| shortcuts:operators * . / : shortcuts:prefixes E                            | times<br>times<br>solidus<br>outof  | /<br>:   |
| shortcuts:operators * . / : shortcuts:prefixes E G                          | times<br>times<br>solidus<br>outof  | /<br>:   |
| shortcuts:operators * . / : shortcuts:prefixes E G M                        | times times solidus outof  exa giga mega  | /<br>:<br>E<br>G<br>M  |
| shortcuts:operators * . / : shortcuts:prefixes E G M P                      | times times solidus outof  exa giga mega peta   |  |
| shortcuts:operators * . / : shortcuts:prefixes E G M P T                    | times times solidus outof  exa giga mega peta tera  | /<br>:<br>E<br>G<br>M<br>P<br>T                                |
| shortcuts:operators * . / : shortcuts:prefixes E G M P T Y                  | times times solidus outof  exa giga mega peta tera yotta  |  |
| shortcuts:operators * . / : shortcuts:prefixes E G M P T Y Z                | times times solidus outof  exa giga mega peta tera yotta zetta                                  |  |
| shortcuts:operators * . / : shortcuts:prefixes E G M P T Y Z a              | times times solidus outof  exa giga mega peta tera yotta zetta atto                             |  |
| shortcuts:operators * . / : shortcuts:prefixes  E G M P T Y Z a c           | times times solidus outof  exa giga mega peta tera yotta zetta atto centi                       |  |
| shortcuts:operators *  . // : shortcuts:prefixes  E G M P T Y Z a c d       | times times solidus outof  exa giga mega peta tera yotta zetta atto centi deci                  |  |
| shortcuts:operators * . // : shortcuts:prefixes  E G M P T Y Z a c d da     | times times solidus outof  exa giga mega peta tera yotta zetta atto centi deci deca             |  |
| shortcuts:operators  *  . // : shortcuts:prefixes  E G M P T Y Z a c d da f | times times solidus outof  exa giga mega peta tera yotta zetta atto centi deci deca femto       | E<br>G<br>M<br>P<br>T<br>Y<br>Z<br>a<br>c<br>d<br>da<br>f      |
| shortcuts:operators * . // : shortcuts:prefixes  E G M P T Y Z a c d da f h | times times solidus outof  exa giga mega peta tera yotta zetta atto centi deci deca femto hecto | E<br>G<br>M<br>P<br>T<br>Y<br>Z<br>a<br>c<br>d<br>da<br>f<br>h |
| shortcuts:operators  *  . // : shortcuts:prefixes  E G M P T Y Z a c d da f | times times solidus outof  exa giga mega peta tera yotta zetta atto centi deci deca femto       | E<br>G<br>M<br>P<br>T<br>Y<br>Z<br>a<br>c<br>d<br>da<br>f      |

| n                  | nano       | n     |
|--------------------|------------|-------|
| p                  | pico       | p     |
| u                  | micro      | μ     |
| у                  | yocto      | y     |
| Z                  | zetto      | zetto |
| shortcuts:suffixes | 5          |       |
| +1                 | linear     | 1     |
| +2                 | square     | 2     |
| +3                 | cubic      | 3     |
| +4                 | quadratic  | 4     |
| -1                 | ilinear    | -1    |
| -2                 | isquare    | -2    |
| -3                 | icubic     | -3    |
| - 4                | iquadratic | -4    |
| 1                  | linear     | 1     |
| 2                  | square     | 2     |
| 3                  | cubic      | 3     |
| 4                  | quadratic  | 4     |
| ^+1                | linear     | 1     |
| ^+2                | square     | 2     |
| ^+3                | cubic      | 3     |
| ^+4                | quadratic  | 4     |
| ^-1                | ilinear    | -1    |
| ^-2                | isquare    | -2    |
| ^-3                | icubic     | -3    |
| ^-4                | iquadratic | -4    |
| ^1                 | linear     | 1     |
| ^2                 | square     | 2     |
| ^3                 | cubic      | 3     |
| ^4                 | quadratic  | 4     |
| shortcuts:units    |            |       |
| A                  | ampere     | A     |
| В                  | bel        | В     |
| Hz                 | hertz      | Hz    |
| W                  | watt       | W     |
| b                  | bel        | В     |
| g                  | gram       | g     |
| h                  | hour       | h     |
| hz                 | hertz      | Hz    |
| l                  | liter      | 1     |
| lx                 | lux        | lx    |
| m                  | meter      | m     |
| min                | minute     | min   |
| n                  | newton     | N     |
| S                  | second     | S     |
| t                  | tonne      | t     |
| V                  | volt       | V     |
|                    |            |       |

|                        | celsius           | °C        |
|------------------------|-------------------|-----------|
| _                      | fahrenheit        | °F        |
| These are also special | :                 |           |
| units:operators        |                   |           |
| OutOf                  | outof             | :         |
| Per                    | per               | /         |
| Solidus                | solidus           | /         |
| Times                  | times             | •         |
| units:packaged         |                   |           |
| Micron                 | micron            | μm        |
| mmHg                   | millimetermercury | mmHg      |
| units:prefixes         |                   |           |
| Atto                   | atto              | a         |
| Centi                  | centi             | С         |
| Deca                   | deca              | da        |
| Deci                   | deci              | d         |
| Exa                    | exa               | E         |
| Exbi                   | exbi              | Ei        |
| Femto                  | femto             | f         |
| Gibi                   | gibi              | Gi        |
| Giga                   | giga              | G         |
| Hecto                  | hecto             | h         |
| Kibi                   | kibi              | Ki        |
| Kilo                   | kilo              | k         |
| Mebi                   | mebi              | Mi        |
| Mega                   | mega              | M         |
| Micro                  | micro             | μ         |
| Milli                  | milli             | m         |
| Nano                   | nano              | n         |
| Pebi                   | pebi              | Pi        |
| Peta                   | peta              | P         |
| Pico                   | pico              | p         |
| Root                   | root              | $\sqrt{}$ |
| Tebi                   | tebi              | Ti        |
| Tera                   | tera              | T         |
| Yobi                   | yobi              | Yi        |
| Yocto                  | yocto             | y         |
| Yotta                  | yotta             | Y         |
| Zebi                   | zebi              | Zi        |
| Zepto                  | zepto             | Z         |
| Zetta                  | zetta             | Z         |
| units:suffixes         |                   |           |
| Cubic                  | cubic             | 3         |
| ICubic                 | icubic            | -3        |
|                        |                   |           |

| ILinear  | ilinear          | -1  |
|--|------------------|-----|
| IQuadratic                                       | iquadratic       | -4  |
| ISquare<br>-                                     | isquare          | -2  |
| Inverse  | inverse          | -1  |
| Linear   | linear           | 1   |
| Quadratic  | quadratic        | 4   |
| Square   | square           | 2   |
| units:symbols                                    |                  |     |
|  | percent          | %   |
| ArcMinute  | arcminute        | ,   |
| ArcSecond  | arcsecond        | "   |
| Degree   | degree           | 0   |
| Degrees  | degree           | 0   |
| Percent  | percent          | %   |
| Permille   | permille         | ‰   |
| Promille   | permille         | ‰   |
| 0  | degree           | 0   |
| ,  | arcminute        | ,   |
|  | arcsecond        | "   |
| units:units                                      |                  |     |
| AMU  | atomicmassunit   | u   |
| Ampere   | ampere           | A   |
| Angstrom   | angstrom         | Å   |
| Astronomical Unit                                | astronomicalunit | au  |
| AstronomicalUnit                                 | astronomicalunit | au  |
| Atm  | atmosphere       | atm |
| Atmosphere                                       | atmosphere       | atm |
| Atomic Mass Unit                                 | atomicmassunit   | u   |
| AtomicMassUnit                                   | atomicmassunit   | u   |
| Bar  | bar              | bar |
| Barn   | barn             | b   |
| Baud   | baud             | Bd  |
| Bel  | bel              | В   |
| Bequerel   | bequerel         | Bq  |
| Bit  | bit              | bit |
| Byte   | byte             | В   |
| Cal  | calorie          | cal |
| Calorie  | calorie          | cal |
| Candela  | candela          | cd  |
| Celsius  | celsius          | °C  |
| Coulomb  | coulomb          | C   |
| Dalton   | dalton           | Da  |
| Day  | day              | d   |
| Degree Celsius                                   | celsius          | °C  |
| -  |                  |     |
| Degree Fahrenheit                                | fahrenheit       | °F  |
| Degree Fahrenheit DegreeCelsius DegreeFahrenheit |                  |     |

| Degrees Celsius    | celsius      | °C   |
|--------------------|--------------|------|
| Degrees Fahrenheit |              | °F   |
| DegreesCelsius     | celsius      | °C   |
| DegreesFahrenheit  | fahrenheit   | °F   |
| Dyne               | dyne         | dyn  |
| Electron Volt      | electronvolt | eV   |
| ElectronVolt       | electronvolt | eV   |
| Erg                | erg          | erg  |
| Erlang             | erlang       | E    |
| Fahrenheit         | fahrenheit   | °F   |
| Farad              | farad        | F    |
| Foot               | foot         | ft   |
| Gal                | gal          | gal  |
| Gauss              | gauss        | G    |
| Gon                | gon          | gon  |
| Grad               | grad         | grad |
| Gram               | gram         | g    |
| Gray               | gray         | Gy   |
| Hectare            | hectare      | ha   |
| Henry              | henry        | Η    |
| Hertz              | hertz        | Hz   |
| Hg                 | mercury      | Hg   |
| Hour               | hour         | h    |
| Inch               | inch         | inch |
| Joule              | joule        | J    |
| Katal              | katal        | kat  |
| Kelvin             | kelvin       | K    |
| Knot               | knot         | kn   |
| Liter              | liter        | l    |
| Litre              | liter        | l    |
| Lumen              | lumen        | lm   |
| Lux                | lux          | lx   |
| Maxwell            | maxwell      | Mx   |
| Meter              | meter        | m    |
| Metre              | meter        | m    |
| Metric Ton         | tonne        | t    |
| MetricTon          | tonne        | t    |
| Minute             | minute       | min  |
| Mol                | mole         | mol  |
| Mole               | mole         | mol  |
| Nautical Mile      | nauticalmile | M    |
| NauticalMile       | nauticalmile | M    |
| Neper              | neper        | Np   |
| Newton             | newton       | N    |
| 0ersted            | oersted      | Oe   |
| Ohm                | ohm          | Ω    |
| Pascal             | pascal       | Pa   |
| Phot               | phot         | phot |
| Poise              | poise        | P    |

| Radian            | radian       | rad   |
|-------------------|--------------|-------|
| Rev               | revolution   | rev   |
| Revolution        | revolution   | rev   |
| Second            | second       | S     |
| Siemens           | siemens      | S     |
| Sievert           | sievert      | Sv    |
| Steradian         | steradian    | sr    |
| Stilb             | stilb        | sb    |
| Stokes            | stokes       | St    |
| Tesla             | tesla        | T     |
| Tonne             | tonne        | t     |
| Volt              | volt         | V     |
| Watt              | watt         | W     |
| Weber             | weber        | Wb    |
| basepoint         | basepoint    | bp    |
| cicero            | cicero       | CC    |
| didot             | didot        | dd    |
| eV                | electronvolt | eV    |
| page              | page         | page  |
| point             | point        | pt    |
| scaledpoint       | scaledpoint  | sp    |
|                   |              |       |
| shortcuts:operato |              |       |
| *                 | times        | •     |
| •                 | times        | •     |
| /                 | solidus      | /     |
| :                 | outof        | :     |
| shortcuts:prefixe | ·s           |       |
| E                 | exa          | E     |
| G                 | giga         | G     |
| M                 | mega         | M     |
| P                 | peta         | P     |
| T                 | tera         | T     |
| Y                 | yotta        | Y     |
| Z                 | zetta        | Z     |
| a                 | atto         | a     |
| С                 | centi        | C     |
| d                 | deci         | d     |
| da                | deca         | da    |
| f                 | femto        | f     |
|                   | hecto        | h     |
| h                 |              |       |
| k<br>             | kilo         | k     |
| m                 | milli        | m     |
| n                 | nano         | n     |
| p<br>             | pico         | p     |
| u                 | micro        | μ     |
| У                 | yocto        | у     |
| Z                 | zetto        | zetto |
|                   |              |       |

| shortcuts:suff | ixes                 |          |
|----------------|----------------------|----------|
| +1             | linear               | 1        |
| +2             | square               | 2        |
| +3             | cubic                | 3        |
| +4             | quadratic            | 4        |
| -1             | ilinear              | -1       |
| -2             | isquare              | -2       |
| -3             | icubic               | -3       |
| -4             | iquadratic           | -4       |
| 1              | linear               | 1        |
| 2              | square               | 2        |
| 3              | cubic                | 3        |
| 4              | quadratic            | 4        |
| ^+1            | linear               | 1        |
| ^+2            | square               | 2        |
| ^+3            | cubic                | 3        |
| ^+4            | quadratic            | 4        |
| ^-1            | ilinear              | -1       |
| ^-2            |                      | -1 $-2$  |
| ^-3            | isquare<br>icubic    | -2<br>-3 |
| ^-4            |                      | -3<br>-4 |
| -4<br>^1       | iquadratic<br>linear | -4<br>1  |
|                |                      |          |
| ^2<br>^3       | square               | 2<br>3   |
| ^4             | cubic<br>quadratic   | 3<br>4   |
|                |                      |          |
| shortcuts:unit | :S                   |          |
| Α              | ampere               | A        |
| В              | bel                  | В        |
| Hz             | hertz                | Hz       |
| W              | watt                 | W        |
| b              | bel                  | В        |
| g              | gram                 | g        |
| h              | hour                 | h        |
| hz             | hertz                | Hz       |
| l              | liter                | 1        |
| lx             | lux                  | lx       |
| m              | meter                | m        |
| min            | minute               | min      |
| n              | newton               | N        |
| S              | second               | S        |
| t              | tonne                | t        |
| V              | volt                 | V        |
| -              | celsius              | °C       |
|                | fahrenheit           | °F       |
|                | Tani Cimerc          | 1        |

# 8 Colofon

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