

# Bovnar (BVNR) — Units & Currencies Reference

Bovnar (BVNR) v1.0 documentation · Units & Currencies Cheat Sheet · 2026-06-01

Spec version 1.0 · 163 physical units · 164 fiat currencies · 50 cryptocurrencies

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## 1. SI Prefixes

Written as `prefix~base` (mandatory `~` separator). Example: `k~m` = kilometre.

Name	Symbol	Factor	Enum ( <code>si_prefix_id_t</code> )
quetta	<code>Q</code>	$10^{30}$	<code>si_quetta</code>
ronna	<code>R</code>	$10^{27}$	<code>si_ronna</code>
yotta	<code>Y</code>	$10^{24}$	<code>si_yotta</code>
zetta	<code>Z</code>	$10^{21}$	<code>si_zetta</code>
exa	<code>E</code>	$10^{18}$	<code>si_exa</code>
peta	<code>P</code>	$10^{15}$	<code>si_peta</code>
tera	<code>T</code>	$10^{12}$	<code>si_tera</code>

Name	Symbol	Factor	Enum ( si_prefix_id_t )
giga	G	10 <sup>9</sup>	si_giga
mega	M	10 <sup>6</sup>	si_mega
kilo	k	10 <sup>3</sup>	si_kilo
hecto	h	10 <sup>2</sup>	si_hecto
deca	da	10 <sup>1</sup>	si_deca
(none)	—	10 <sup>0</sup>	si_none
deci	d	10 <sup>-1</sup>	si_deci
centi	c	10 <sup>-2</sup>	si_cent
milli	m	10 <sup>-3</sup>	si_milli
micro	μ	10 <sup>-6</sup>	si_micro
nano	n	10 <sup>-9</sup>	si_nano
pico	p	10 <sup>-12</sup>	si_pico
femto	f	10 <sup>-15</sup>	si_femto
atto	a	10 <sup>-18</sup>	si_atto
zepto	z	10 <sup>-21</sup>	si_zepto
yocto	y	10 <sup>-24</sup>	si_yocto
ronto	r	10 <sup>-27</sup>	si_ronto
quecto	q	10 <sup>-30</sup>	si_quecto

μ is U+00B5 MICRO SIGN (UTF-8 0xC2 0xB5). U+03BC (Greek small letter mu) is **not** accepted. da is a two-character prefix: da~m = decametre.

**Prefix-base ambiguities** — resolved by the mandatory ~:

Bare token	Is a base unit	With ~ becomes prefix
m	meter ( bu_meter )	milli
d	day ( bu_day )	deci
h	hour ( bu_hour )	hecto
T	tesla ( bu_tesla )	tera
G	gauss ( bu_gauss )	giga
P	poise ( bu_poise )	peta
R	röntgen ( bu_roentgen )	ronna
f	farad ( bu_farad )	femto
S	siemens ( bu_siemens )	(not a prefix — S has no prefix role)

Examples: bare m = metre; m~s = millisecond. Bare d = day; d~s = decisecond.

## 2. IEC Binary Prefixes

Used **only** on **b** (bit) and **B** (byte). Written as `prefix~base`: `Ki~B` = kibibyte.

Name	Symbol	Factor	Enum ( <code>iec_prefix_id_t</code> )
kibi	<b>Ki</b>	2 <sup>10</sup>	<code>iec_kibi</code>
mebi	<b>Mi</b>	2 <sup>20</sup>	<code>iec_mebi</code>
gibi	<b>Gi</b>	2 <sup>30</sup>	<code>iec_gibi</code>
tebi	<b>Ti</b>	2 <sup>40</sup>	<code>iec_tebi</code>
pebi	<b>Pi</b>	2 <sup>50</sup>	<code>iec_pebi</code>
exbi	<b>Ei</b>	2 <sup>60</sup>	<code>iec_exbi</code>
zebi	<b>Zi</b>	2 <sup>70</sup>	<code>iec_zebi</code>
yobi	<b>Yi</b>	2 <sup>80</sup>	<code>iec_yobi</code>
robi	<b>Ri</b>	2 <sup>90</sup>	<code>iec_robi</code>
quebi	<b>Qi</b>	2 <sup>100</sup>	<code>iec_quebi</code>

## 3. Prefix Validity Rules

Unit category	SI prefixes	IEC prefixes
All physical units (default)	All 24 allowed	Forbidden
<b>b</b> (bit) and <b>B</b> (byte)	Only ≥ kilo ( <b>k</b> , <b>M</b> , <b>G</b> , ..., <b>Q</b> )	All 10 allowed
<b>b</b> and <b>B</b> with sub-kilo SI ( <b>d</b> , <b>c</b> , <b>m</b> , <b>μ</b> , <b>n</b> , <b>p</b> , <b>f</b> , <b>a</b> , <b>z</b> , <b>y</b> , <b>r</b> , <b>q</b> , <b>da</b> , <b>h</b> )	<b>Forbidden</b>	—
Currency codes	All 24 allowed	<b>Forbidden</b>
Old German units ( <code>bu_pfund</code> ... <code>bu_scheffel</code> )	<b>None</b> ( <code>si_none</code> only)	<b>Forbidden</b>

## 4. Physical Units

**Symbol** = canonical serialized form (produced on output; accepted on input). **Long forms** = accepted on input only; never produced on output. **Factor** = conversion factor to SI base units unless noted.

## 4.1 SI Base Units

Symbol	Long forms	Name	Enum
s	sec , second , seconds	second	bu_second
m	meter , metre , meters , metres	metre	bu_meter
g	gram , grams	gram	bu_gram
A	amp , amps , ampere , amperes	ampere	bu_ampere
K	kelvin , kelvins	kelvin	bu_kelvin
mol	mole , moles	mole	bu_mol
cd	candela , candelas	candela	bu_candela

g (gram) is the base symbol; k~g = kilogram.

## 4.2 Named SI-Derived Units

Symbol	Long forms	Name	Enum	SI definition
Hz	hertz	hertz	bu_hertz	s <sup>-1</sup>
N	newton , newtons	newton	bu_newton	kg·m·s <sup>-2</sup>
Pa	pascal , pascals	pascal	bu_pascal	kg·m <sup>-1</sup> ·s <sup>-2</sup>
J	joule , joules	joule	bu_joule	kg·m <sup>2</sup> ·s <sup>-2</sup>
W	watt , watts	watt	bu_watt	kg·m <sup>2</sup> ·s <sup>-3</sup>
V	volt , volts	volt	bu_volt	kg·m <sup>2</sup> ·A <sup>-1</sup> ·s <sup>-3</sup>
Ω	ohm , ohms , Ohm	ohm	bu_ohm	kg·m <sup>2</sup> ·A <sup>-2</sup> ·s <sup>-3</sup> — U+2126 OHM SIGN; U+03A9 (Greek capital omega) <b>not</b> accepted
F	farad , farads	farad	bu_farad	kg <sup>-1</sup> ·m <sup>-2</sup> ·A <sup>2</sup> ·s <sup>4</sup>
C	coulomb , coulombs	coulomb	bu_coulomb	A·s
S	siemens	siemens	bu_siemens	kg <sup>-1</sup> ·m <sup>-2</sup> ·A <sup>2</sup> ·s <sup>3</sup>
Wb	weber , webers	weber	bu_weber	kg·m <sup>2</sup> ·A <sup>-1</sup> ·s <sup>-2</sup>
T	tesla , teslas	tesla	bu_tesla	kg·A <sup>-1</sup> ·s <sup>-2</sup>
H	henry , henrys , henries	henry	bu_henry	kg·m <sup>2</sup> ·A <sup>-2</sup> ·s <sup>-2</sup>
lm	lumen , lumens	lumen	bu_lumen	cd·sr
lx	lux	lux	bu_lux	cd·sr·m <sup>-2</sup>
Bq	becquerel , becquerels	becquerel	bu_becquerel	s <sup>-1</sup>

Symbol	Long forms	Name	Enum	SI definition
Gy	gray , grays	gray	bu_gray	$\text{m}^2 \cdot \text{s}^{-2}$
Sv	sievert , sieverts	sievert	bu_sievert	$\text{m}^2 \cdot \text{s}^{-2}$
kat	katal , katal	katal	bu_katal	$\text{mol} \cdot \text{s}^{-1}$
rad	radian , radians	radian	bu_radian	dimensionless (m/m)
sr	steradian , steradians	steradian	bu_steradian	dimensionless ( $\text{m}^2/\text{m}^2$ )

### 4.3 Non-SI Units Accepted with SI

Symbol	Long forms	Name	Enum	Factor / notes
L , l	liter , litre , liters , litres	litre	bu_liter	$10^{-3} \text{ m}^3$
min	minute , minutes	minute	bu_minute	60 s
h	hour , hours	hour	bu_hour	3600 s
d	day , days	day	bu_day	86400 s
wk	week , weeks	week	bu_week	604 800 s
mo	month , months	month (Julian)	bu_month	2 629 800 s (= 365.25 d / 12)
fn	fortnight , fortnights	fortnight	bu_fortnight	1 209 600 s (= 14 d)
yr	year , years	year (Julian)	bu_year	31 557 600 s
° , deg	degr , degree , degrees	degree (angle)	bu_degree	$\pi/180 \text{ rad}$ — U+00B0
t	tonne	tonne	bu_tonne	$10^3 \text{ kg}$
bar	—	bar	bu_bar	$10^5 \text{ Pa}$
eV	electronvolt	electronvolt	bu_electronvolt	$1.602176634 \times 10^{-19} \text{ J}$
Da	dalton	dalton	bu_dalton	$1.66053906660 \times 10^{-27} \text{ kg}$
au	—	astronomical unit	bu_astronomical_unit	$1.495978707 \times 10^{11} \text{ m}$
ha	hectare	hectare	bu_hectare	$10^4 \text{ m}^2$

### 4.4 Imperial & US Customary — Length

Symbol	Long forms	Name	Enum	Factor
in	inch , inches	inch	bu_inch	0.0254 m (exact)
ft	foot , feet	foot	bu_foot	0.3048 m (exact)
yd	yard , yards	yard	bu_yard	0.9144 m (exact)

Symbol	Long forms	Name	Enum	Factor
<code>mi</code>	<code>mile</code> , <code>miles</code>	statute mile	<code>bu_mile</code>	1609.344 m (exact)
<code>nmi</code>	<code>nautical_mile</code> , <code>nautical_miles</code>	nautical mile	<code>bu_nautical_mile</code>	1852 m (exact)
<code>Å</code> (U+212B)	<code>angstrom</code> , <code>angstroms</code> , <code>Å</code> (U+00C5)	ångström	<code>bu_angstrom</code>	10 <sup>-10</sup> m
<code>ly</code>	<code>light_year</code> , <code>light_years</code>	light-year	<code>bu_light_year</code>	9.4607304725808×10 <sup>15</sup> m
<code>pc</code>	<code>parsec</code> , <code>parsecs</code>	parsec	<code>bu_parsec</code>	3.085677581491367×10 <sup>16</sup> m
<code>fur</code>	<code>furlong</code> , <code>furlongs</code>	furlong	<code>bu_furlong</code>	201.168 m (exact)
<code>fath</code>	<code>fathom</code> , <code>fathoms</code>	fathom	<code>bu_fathom</code>	1.8288 m (exact)
<code>thou</code>	<code>thou</code> , <code>mil</code> , <code>mils</code>	thou	<code>bu_thou</code>	25.4×10 <sup>-6</sup> m (exact)
<code>ch</code>	<code>chain</code> , <code>chains</code>	chain (Gunter's)	<code>bu_chain</code>	20.1168 m (exact)
<code>rd</code>	<code>rod</code> , <code>rods</code>	rod (pole, perch)	<code>bu_rod</code>	5.0292 m (exact)

`thou` and `mil` are synonyms. Canonical output is `thou`. `mil` does **not** mean milliradian; milliradians are written `m~rad`.

## 4.5 Imperial & US Customary — Mass

Symbol	Long forms	Name	Enum	Factor
<code>lb</code>	<code>lbs</code> , <code>pound</code> , <code>pounds</code>	pound (avoirdupois)	<code>bu_pound</code>	0.45359237 kg (exact)
<code>oz</code>	<code>ounce</code> , <code>ounces</code>	ounce (avoirdupois)	<code>bu_ounce</code>	0.028349523125 kg (exact)
<code>gr</code>	<code>grain</code> , <code>grains</code>	grain	<code>bu_grain</code>	6.479891×10 <sup>-5</sup> kg (exact)
<code>st</code>	<code>stone</code> , <code>stones</code>	stone	<code>bu_stone</code>	6.35029318 kg (exact)
<code>tn_sh</code>	<code>short_ton</code> , <code>short_tons</code>	short ton (US)	<code>bu_short_ton</code>	907.18474 kg (exact)
<code>tn_l</code>	<code>long_ton</code> , <code>long_tons</code>	long ton (UK)	<code>bu_long_ton</code>	1016.0469088 kg (exact)
<code>oz_t</code>	<code>troy_ounce</code> , <code>troy_ounces</code>	troy ounce	<code>bu_troy_ounce</code>	0.0311034768 kg (exact)
<code>ct</code>	<code>carat</code> , <code>carats</code>	metric carat	<code>bu_carat</code>	2×10 <sup>-4</sup> kg (exact)
<code>slug</code>	<code>slugs</code>	slug	<code>bu_slug</code>	14.593902937 kg
<code>dr</code>	<code>dram</code> , <code>drams</code>	dram (avoirdupois)	<code>bu_dram</code>	1.7718451953125×10 <sup>-3</sup> kg (exact)

Symbol	Long forms	Name	Enum	Factor
dwt	pennyweight, pennyweights	pennyweight (troy)	bu_pennyweight	$1.55517384 \times 10^{-3}$ kg (exact)

## 4.6 Temperature

Symbol	Long forms	Name	Enum	Conversion
°C, degC	degrC, degreeC, degreesC, celsius	degree Celsius	bu_celsius	$K = ^\circ C + 273.15$ <b>(affine)</b>
°F, degF	degrF, degreeF, degreesF, fahrenheit	degree Fahrenheit	bu_fahrenheit	$K = (^\circ F + 459.67) \times 5/9$ <b>(affine)</b>
°Ra, degRa	degrRa, degreeRa, degreesRa, rankine	degree Rankine	bu_rankine	$K = ^\circ Ra \times 5/9$ (linear)
°De, degDe	degrDe, degreeDe, degreesDe, delisle	degree Delisle	bu_delisle	$K = 373.15 - ^\circ De \times 2/3$ <b>(affine)</b>
°N, degN	degrN, degreeN, degreesN, newton_temperature	degree Newton	bu_newton_temp	$K = ^\circ N \times 100/33 + 273.15$ <b>(affine)</b>
°Re, degRe	degrRe, degreeRe, degreesRe, reaumur	degree Réaumur	bu_reaumur	$K = ^\circ Re \times 5/4 + 273.15$ <b>(affine)</b>
°Ro, degRo	degrRo, degreeRo, degreesRo, romer	degree Rømer	bu_romer	$K = (^\circ Ro - 7.5) \times 40/21 + 273.15$ <b>(affine)</b>

Kelvin (**K**) is in §4.1. **R** is reserved for röntgen (§4.20). **N** alone is newton (§4.2); use °N or degN for Newton temperature.

## 4.7 Pressure

Symbol	Long forms	Name	Enum	Factor
atm	atmosphere, atmospheres	standard atmosphere	bu_atmosphere	101 325 Pa (exact)
at	atmosphere_technical	atmosphere technical	bu_atmosphere_technical	98 066.5 Pa (= 1 kgf/cm <sup>2</sup> )
mmHg	—	millimetre of mercury	bu_mmhg	133.322387415 Pa
Torr	torr	torr	bu_torr	101 325/760 Pa
psi	—	pound-force per square inch	bu_psi	6894.757293168361 Pa
inHg	inch_hg, inch_mercury	inch of mercury	bu_inch_hg	3386.388640 Pa

`at`  $\neq$  `atm`: 1 at = 98 066.5 Pa; 1 atm = 101 325 Pa.

## 4.8 Energy

Symbol	Long forms	Name	Enum	Factor
<code>cal</code>	<code>calorie</code> , <code>calories</code>	thermochemical calorie	<code>bu_calorie</code>	4.184 J (exact)
<code>Btu</code>	<code>btu</code> , <code>BTU</code>	International Table BTU	<code>bu_btu</code>	1055.05585262 J
<code>erg</code>	<code>ergs</code>	erg	<code>bu_erg</code>	$10^{-7}$ J (exact)
<code>thm</code>	<code>therm</code> , <code>therms</code>	US therm	<code>bu_therm</code>	$1.05480400 \times 10^8$ J (exact)
<code>ft_lb</code>	<code>foot_pound</code> , <code>foot_pounds</code>	foot-pound	<code>bu_foot_pound</code>	1.3558179483 J

`BTU` (all-caps) is a valid alias: the currency lookup fails first (no ISO 4217 match), then the physical unit table matches `bu_btu`. `Btu` and `btu` are also accepted.

## 4.9 Power

Symbol	Long forms	Name	Enum	Factor
<code>hp</code>	<code>horsepower</code>	mechanical horsepower	<code>bu_horsepower</code>	745.69987158227 W
<code>PS</code>	<code>CV</code> , <code>metric_horsepower</code>	metric horsepower	<code>bu_metric_horsepower</code>	735.49875 W (exact)

## 4.10 Force

Symbol	Long forms	Name	Enum	Factor
<code>lbf</code>	<code>pound_force</code>	pound-force	<code>bu_pound_force</code>	4.4482216152605 N
<code>dyn</code>	<code>dyne</code> , <code>dynes</code>	dyne	<code>bu_dyne</code>	$10^{-5}$ N (exact)
<code>kip</code>	<code>kips</code>	kip (kilopound-force)	<code>bu_kip</code>	4448.2216152605 N
<code>kgf</code>	<code>kilogram_force</code>	kilogram-force	<code>bu_kilogram_force</code>	9.80665 N (exact)

## 4.11 Speed & Rotation

Symbol	Long forms	Name	Enum	Factor
<code>kn</code>	<code>knot</code> , <code>knots</code>	knot	<code>bu_knot</code>	1852/3600 m/s
<code>rpm</code>	—	revolutions per minute	<code>bu_rpm</code>	$1/60$ s <sup>-1</sup>



## 4.12 Acceleration

Symbol	Long forms	Name	Enum	Factor
gn	standard_gravity	standard gravity	bu_standard_gravity	9.80665 m·s <sup>-2</sup> (exact)

## 4.13 Volume — US Liquid

Symbol	Long forms	Name	Enum	Factor
gal	gallon, gallons	US liquid gallon	bu_gallon	3.785411784×10 <sup>-3</sup> m <sup>3</sup> (exact)
qt	quart, quarts	US liquid quart	bu_quart	9.46352946×10 <sup>-4</sup> m <sup>3</sup>
pt	pint, pints	US liquid pint	bu_pint	4.73176473×10 <sup>-4</sup> m <sup>3</sup>
cup	cups	US cup	bu_cup	2.365882365×10 <sup>-4</sup> m <sup>3</sup>
gi	gill, gills	US gill	bu_gill	1.18294118250×10 <sup>-4</sup> m <sup>3</sup>
fl_oz	fluid_ounce, fluid_ounces	US fluid ounce	bu_fluid_ounce	2.95735295625×10 <sup>-5</sup> m <sup>3</sup>
tbsp	tablespoon, tablespoons	US tablespoon	bu_tablespoon	1.47867648×10 <sup>-5</sup> m <sup>3</sup>
tsp	teaspoon, teaspoons	US teaspoon	bu_teaspoon	4.92892159375×10 <sup>-6</sup> m <sup>3</sup>
bbl	barrel, barrels	petroleum barrel	bu_barrel	0.158987294928 m <sup>3</sup>

cup (lowercase) = US cup; CUP (uppercase) = Cuban Peso. See §6.

## 4.14 Volume — UK Imperial

Symbol	Long forms	Name	Enum	Factor
gal_uk	gallon_uk, gallons_uk	imperial gallon	bu_gallon_uk	4.54609×10 <sup>-3</sup> m <sup>3</sup> (exact)
qt_uk	quart_uk, quarts_uk	imperial quart	bu_quart_uk	1136.5225×10 <sup>-6</sup> m <sup>3</sup>
pt_uk	pint_uk, pints_uk	imperial pint	bu_pint_uk	568.26125×10 <sup>-6</sup> m <sup>3</sup>
gi_uk	gill_uk, gills_uk	imperial gill	bu_gill_uk	1.420653125×10 <sup>-4</sup> m <sup>3</sup> (exact)
fl_oz_uk	fluid_ounce_uk, fluid_ounces_uk	imperial fluid ounce	bu_fluid_ounce_uk	28.4130625×10 <sup>-6</sup> m <sup>3</sup>

## 4.15 Volume — US Apothecary & Dry

Symbol	Long forms	Name	Enum	Factor
<code>fl_dr</code>	<code>fluid_dram</code> , <code>fluid_drams</code>	US fluid dram	<code>bu_fluid_dram</code>	$3.6966911953125 \times 10^{-6} \text{ m}^3$
<code>minim</code>	<code>minims</code>	US minim	<code>bu_minim</code>	$6.16115199218750 \times 10^{-8} \text{ m}^3$
<code>pk</code>	<code>peck</code> , <code>pecks</code>	US dry peck	<code>bu_peck</code>	$8.80976754172 \times 10^{-3} \text{ m}^3$
<code>bsh</code>	<code>bushel</code> , <code>bushels</code>	US bushel	<code>bu_bushel</code>	$3.523907016688 \times 10^{-2} \text{ m}^3$

`minim` not `min` (which is the minute).

## 4.16 Area

Symbol	Long forms	Name	Enum	Factor
<code>ac</code>	<code>acre</code> , <code>acres</code>	acre	<code>bu_acre</code>	$4046.8564224 \text{ m}^2$ (exact)
<code>barn</code>	<code>barns</code>	barn	<code>bu_barn</code>	$10^{-28} \text{ m}^2$ (exact)

## 4.17 Angle

Symbol	Long forms	Name	Enum	Factor
<code>arcmin</code>	<code>arcminute</code> , <code>arcminutes</code>	arcminute	<code>bu_arcminute</code>	$\pi/10800 \text{ rad}$
<code>arcsec</code>	<code>arcsecond</code> , <code>arcseconds</code>	arcsecond	<code>bu_arcsecond</code>	$\pi/648000 \text{ rad}$
<code>grad</code>	<code>gradian</code> , <code>gradians</code> , <code>gon</code>	gradian	<code>bu_grad</code>	$\pi/200 \text{ rad}$
<code>rev</code>	<code>turn</code> , <code>revolution</code> , <code>revolutions</code> , <code>turns</code>	revolution	<code>bu_revolution</code>	$2\pi \text{ rad}$

## 4.18 Digital

Symbol	Long forms	Name	Enum
<code>b</code>	<code>bit</code> , <code>bits</code>	bit	<code>bu_bit</code>
<code>B</code>	<code>byte</code> , <code>bytes</code> , <code>Byte</code> , <code>Bytes</code>	byte	<code>bu_byte</code>

## 4.19 CGS Units

Symbol	Long forms	Name	Enum	SI equivalent
<code>P</code>	<code>poise</code> , <code>poises</code>	poise (dynamic viscosity)	<code>bu_poise</code>	$0.1 \text{ Pa}\cdot\text{s}$
<code>St</code>	<code>stokes</code> , <code>stoke</code>	stokes (kinematic viscosity)	<code>bu_stokes</code>	$10^{-4} \text{ m}^2\cdot\text{s}^{-1}$
<code>G</code>	<code>gauss</code>	gauss (magnetic flux density)	<code>bu_gauss</code>	$10^{-4} \text{ T}$
<code>Mx</code>	<code>maxwell</code> , <code>maxwells</code>	maxwell (magnetic flux)	<code>bu_maxwell</code>	$10^{-8} \text{ Wb}$
<code>Oe</code>	<code>oersted</code> , <code>oersteds</code>	oersted (magnetic field strength)	<code>bu_oersted</code>	$1000/(4\pi) \text{ A/m}$

Symbol	Long forms	Name	Enum	SI equivalent
<code>sb</code>	<code>stilb</code> , <code>stilbs</code>	stilb (luminance)	<code>bu_stilb</code>	10 <sup>4</sup> cd/m <sup>2</sup>
<code>ph</code>	<code>phot</code> , <code>photos</code>	phot (illuminance)	<code>bu_phot</code>	10 <sup>4</sup> lx
<code>Gal</code>	<code>galileo</code> , <code>galileos</code>	galileo (acceleration)	<code>bu_galileo</code>	10 <sup>-2</sup> m/s <sup>2</sup>

## 4.20 Radiation

Symbol	Long forms	Name	Enum	SI equivalent
<code>Ci</code>	<code>curie</code> , <code>curies</code>	curie (radioactivity)	<code>bu_curie</code>	3.7×10 <sup>10</sup> Bq
<code>R</code>	<code>roentgen</code> , <code>roentgens</code>	röntgen (radiation exposure)	<code>bu_roentgen</code>	2.58×10 <sup>-4</sup> C/kg
<code>rem</code>	<code>rems</code>	rem (dose equivalent)	<code>bu_rem</code>	10 <sup>-2</sup> Sv

## 4.21 Logarithmic

Symbol	Long forms	Name	Enum	Notes
<code>Np</code>	<code>neper</code> , <code>nepers</code>	neper	<code>bu_neper</code>	dimensionless; 1 Np = 20/ln(10) dB ≈ 8.686 dB
<code>dB</code>	<code>decibel</code> , <code>decibels</code>	decibel	<code>bu_decibel</code>	dimensionless

## 4.22 Electrical Power

Symbol	Long forms	Name	Enum	Notes
<code>var</code>	<code>vars</code>	var (volt-ampere reactive)	<code>bu_var</code>	reactive power; same SI dim as W
<code>VA</code>	<code>volt_ampere</code> , <code>volt_amperes</code>	volt-ampere	<code>bu_volt_ampere</code>	apparent power; same SI dim as W

`W`, `var`, and `VA` all have SI dimension kg·m<sup>2</sup>·s<sup>-3</sup>. `bvn_units_compatible` returns `true` across them; use `.components[0].base` to distinguish.

## 4.23 Textile Linear Density

Symbol	Long forms	Name	Enum	Factor
<code>tex</code>	—	tex	<code>bu_tex</code>	1×10 <sup>-6</sup> kg/m (ISO 1144)
<code>den</code>	<code>denier</code> , <code>deniers</code>	denier	<code>bu_denier</code>	1/9 000 000 kg/m

9 den = 1 tex.

## 4.24 Old German Units

No Old German unit accepts any SI or IEC prefix ( `bvn_prefix_unit_valid` rejects all non-`si_none` prefixes for `bu_pfund` ... `bu_scheffel` ). Enum values 348–360.

### Mass (metric-compatible)

Symbol	Long forms	Name	Enum	Factor
<code>Pfd</code>	<code>pfund</code> , <code>pfunds</code>	Pfund	<code>bu_pfund</code>	0.5 kg (exact)
<code>Ztr</code>	<code>zentner</code>	Zentner	<code>bu_zentner</code>	50 kg (exact)
<code>dz</code>	<code>doppelzentner</code>	Doppelzentner	<code>bu_doppelzentner</code>	100 kg (exact)
<code>lot</code>	<code>lots</code>	Lot	<code>bu_lot</code>	15.625×10 <sup>-3</sup> kg (exact)

### Length (historical Prussian)

Symbol	Long forms	Name	Enum	Factor
<code>prln</code>	<code>prussian_line</code> , <code>linie</code>	Prussian line	<code>bu_prussian_line</code>	2.17953×10 <sup>-3</sup> m
<code>prz</code>	<code>prussian_zoll</code> , <code>zoll</code>	Prussian Zoll	<code>bu_prussian_zoll</code>	2.61544×10 <sup>-2</sup> m
<code>prf</code>	<code>prussian_fuss</code> , <code>preussischer_fuss</code>	Prussian Fuß	<code>bu_prussian_fuss</code>	3.13853×10 <sup>-1</sup> m
<code>elle</code>	<code>prussian_elle</code> , <code>preussische_elle</code>	Prussian Elle	<code>bu_prussian_elle</code>	6.67160×10 <sup>-1</sup> m
<code>rute</code>	<code>prussian_rute</code> , <code>preussische_rute</code>	Prussian Rute	<code>bu_prussian_rute</code>	3.76624 m
<code>klafter</code>	<code>prussian_klafter</code>	Klafter	<code>bu_klafter</code>	1.88312 m
<code>dt_mi</code>	<code>deutsche_meile</code> , <code>german_mile</code>	Geographische Meile	<code>bu_german_mile</code>	7420.44 m

### Area (historical Prussian)

Symbol	Long forms	Name	Enum	Factor
<code>morgen</code>	<code>prussian_morgen</code>	Morgen (Prussian)	<code>bu_morgen</code>	2553.22 m <sup>2</sup>

### Volume (historical Prussian)

Symbol	Long forms	Name	Enum	Factor
<code>schffl</code>	<code>scheffel</code> , <code>prussian_scheffel</code>	Scheffel (Prussian)	<code>bu_scheffel</code>	54.961×10 <sup>-3</sup> m <sup>3</sup>

## 4.25 Additional Physical Units (361-367)

### Length

Symbol	Long forms	Name	Enum	Factor
ftUS	survey_foot	US survey foot	bu_survey_foot	1200/3937 m $\approx$ 0.30480061 m
lea	league , leagues	League (US statute, 3 mi)	bu_league	4828.032 m
cbl	cable , cables	Cable (international, $\frac{1}{10}$ nmi)	bu_cable	185.2 m
hand	hands	Hand (4 in)	bu_hand	0.1016 m

### Mass

Symbol	Long forms	Name	Enum	Factor
qntl	quintal , quintals	Metric quintal	bu_quintal	100 kg
sc	scruple , scruples	Apothecary scruple (20 gr)	bu_scruple	$1.2959782 \times 10^{-3}$ kg

### Signal Rate

Symbol	Long forms	Name	Enum	SI dimension
Bd	baud , bauds	Baud (symbol/s)	bu_baud	s <sup>-1</sup>

SI prefixes are accepted on all units in this section. IEC prefixes are rejected for all non-digital units.

## 4.26 Ratio and Proportion (372-377)

Dimensionless scaling factors: 5 %  $\equiv$  0.05 , 250 ppm  $\equiv$  0.00025 . These do **not** accept SI or IEC prefixes.

Symbol	Long forms	Name	Enum	Factor
%	percent	per cent	bu_percent	10 <sup>-2</sup>
‰	per_mille	per mille	bu_per_mille	10 <sup>-3</sup>
‱	per_myriad	per myriad	bu_per_myriad	10 <sup>-4</sup>
pcm	per_cent_mille	per cent mille	bu_per_cent_mille	10 <sup>-5</sup>
ppm	—	parts per million	bu_ppm	10 <sup>-6</sup>
ppb	—	parts per billion	bu_ppb	10 <sup>-9</sup>

## 5. Currencies

### 5.1 The Mandatory Currency Sigil

As of spec 1.0 a currency code carries a **mandatory \$ sigil**: write `$USD`, `$BTC`, `k~$EUR`, `$USD/oz_t`. The codes listed in the tables below are the bare ISO 4217 / crypto identifiers — prefix each with `$` when you use it in a document. A bare code (no `$`) is **not** a currency; it is matched against the physical-unit table and raises `error_unit_illegal` if it is not a unit. This removes every currency/unit namespace collision (e.g. `$CUP` the Cuban Peso vs `cup` the unit).

### 5.2 ISO 4217 Fiat Currencies

164 codes occupying `value_base_unit_t` slots **134 ... 297** (`BVN_CURRENCY_FIAT_FIRST ... BVN_CURRENCY_FIAT_LAST`). Currencies have no named `bu_*` enumerators — they are resolved from the `$`-sigil code by `bvn_parse_currency_str` and carried as the numeric `base` value; query them with `bvn_unit_is_fiat` / `bvn_currency_info`.

**Min** = minor unit exponent N: 1 major unit =  $10^N$  minor units (e.g. 1 USD = 100 cents, N=2). Minor units are **bold** when they differ from 2. `numeric_code` is the ISO 4217 numeric identifier.

Code	Num	Min	Name
AED	784	2	UAE Dirham
AFN	971	2	Afghan Afghani
ALL	8	2	Albanian Lek
AMD	51	2	Armenian Dram
ANG	532	2	Netherlands Antillean Guilder
AOA	973	2	Angolan Kwanza
ARS	32	2	Argentine Peso
AUD	36	2	Australian Dollar
AWG	533	2	Aruban Florin
AZN	944	2	Azerbaijani Manat
BAM	977	2	Bosnia-Herzegovina Convertible Mark
BBD	52	2	Barbados Dollar
BDT	50	2	Bangladeshi Taka
BGN	975	2	Bulgarian Lev
BHD	48	<b>3</b>	Bahraini Dinar
BIF	108	<b>0</b>	Burundian Franc

Code	Num	Min	Name
BMD	60	2	Bermudian Dollar
BND	96	2	Brunei Dollar
BOB	68	2	Boliviano
BRL	986	2	Brazilian Real
BSD	44	2	Bahamian Dollar
BTN	64	2	Bhutanese Ngultrum
BWP	72	2	Botswana Pula
BYN	933	2	Belarusian Ruble
BZD	84	2	Belize Dollar
CAD	124	2	Canadian Dollar
CDF	976	2	Congolese Franc
CHF	756	2	Swiss Franc
CLF	990	4	Unidad de Fomento
CLP	152	0	Chilean Peso
CNY	156	2	Chinese Yuan
COP	170	2	Colombian Peso
CRC	188	2	Costa Rican Colon
CUP	192	2	Cuban Peso
CVE	132	2	Cape Verdean Escudo
CZK	203	2	Czech Koruna
DJF	262	0	Djiboutian Franc
DKK	208	2	Danish Krone
DOP	214	2	Dominican Peso
DZD	12	2	Algerian Dinar
EGP	818	2	Egyptian Pound
ERN	232	2	Eritrean Nakfa
ETB	230	2	Ethiopian Birr
EUR	978	2	Euro
FJD	242	2	Fijian Dollar
FKP	238	2	Falkland Islands Pound
GBP	826	2	Pound Sterling
GEL	981	2	Georgian Lari
GHS	936	2	Ghanaian Cedi
GIP	292	2	Gibraltar Pound

Code	Num	Min	Name
GMD	270	2	Gambian Dalasi
GNF	324	0	Guinean Franc
GTQ	320	2	Guatemalan Quetzal
GYD	328	2	Guyanese Dollar
HKD	344	2	Hong Kong Dollar
HNL	340	2	Honduran Lempira
HRK	191	2	Croatian Kuna
HTG	332	2	Haitian Gourde
HUF	348	2	Hungarian Forint
IDR	360	2	Indonesian Rupiah
ILS	376	2	Israeli New Shekel
INR	356	2	Indian Rupee
IQD	368	3	Iraqi Dinar
IRR	364	2	Iranian Rial
ISK	352	0	Icelandic Krona
JMD	388	2	Jamaican Dollar
JOD	400	3	Jordanian Dinar
JPY	392	0	Japanese Yen
KES	404	2	Kenyan Shilling
KGS	417	2	Kyrgystani Som
KHR	116	2	Cambodian Riel
KMF	174	0	Comorian Franc
KPW	408	2	North Korean Won
KRW	410	0	South Korean Won
KWD	414	3	Kuwaiti Dinar
KYD	136	2	Cayman Islands Dollar
KZT	398	2	Kazakhstani Tenge
LAK	418	2	Laotian Kip
LBP	422	2	Lebanese Pound
LKR	144	2	Sri Lankan Rupee
LRD	430	2	Liberian Dollar
LSL	426	2	Lesotho Loti
LYD	434	3	Libyan Dinar
MAD	504	2	Moroccan Dirham



Code	Num	Min	Name
MDL	498	2	Moldovan Leu
MGA	969	2	Malagasy Ariary
MKD	807	2	Macedonian Denar
MMK	104	2	Myanmar Kyat
MNT	496	2	Mongolian Togrog
MOP	446	2	Macanese Pataca
MRU	929	2	Mauritanian Ouguiya
MUR	480	2	Mauritian Rupee
MVR	462	2	Maldivian Rufiyaa
MWK	454	2	Malawian Kwacha
MXN	484	2	Mexican Peso
MYR	458	2	Malaysian Ringgit
MZN	943	2	Mozambican Metical
NAD	516	2	Namibian Dollar
NGN	566	2	Nigerian Naira
NIO	558	2	Nicaraguan Cordoba
NOK	578	2	Norwegian Krone
NPR	524	2	Nepalese Rupee
NZD	554	2	New Zealand Dollar
OMR	512	3	Omani Rial
PAB	590	2	Panamanian Balboa
PEN	604	2	Peruvian Sol
PGK	598	2	Papua New Guinean Kina
PHP	608	2	Philippine Peso
PKR	586	2	Pakistani Rupee
PLN	985	2	Polish Zloty
PYG	600	0	Paraguayan Guarani
QAR	634	2	Qatari Riyal
RON	946	2	Romanian Leu
RSD	941	2	Serbian Dinar
RUB	643	2	Russian Ruble
RWF	646	0	Rwandan Franc
SAR	682	2	Saudi Riyal
SBD	90	2	Solomon Islands Dollar

Code	Num	Min	Name
SCR	690	2	Seychellois Rupee
SDG	938	2	Sudanese Pound
SEK	752	2	Swedish Krona
SGD	702	2	Singapore Dollar
SHP	654	2	Saint Helena Pound
SLE	925	2	Sierra Leonean Leone
SLL	694	2	Sierra Leonean Leone (old)
SOS	706	2	Somali Shilling
SSP	728	2	South Sudanese Pound
SRD	968	2	Surinamese Dollar
STN	930	2	Sao Tome and Principe Dobra
SVC	222	2	Salvadoran Colon
SYP	760	2	Syrian Pound
SZL	748	2	Swazi Lilangeni
THB	764	2	Thai Baht
TJS	972	2	Tajikistani Somoni
TMT	934	2	Turkmenistan Manat
TND	788	3	Tunisian Dinar
TOP	776	2	Tongan Pa'anga
TRY	949	2	Turkish Lira
TTD	780	2	Trinidad and Tobago Dollar
TWD	901	2	New Taiwan Dollar
TZS	834	2	Tanzanian Shilling
UAH	980	2	Ukrainian Hryvnia
UGX	800	0	Ugandan Shilling
USD	840	2	US Dollar
UYU	858	2	Uruguayan Peso
UZS	860	2	Uzbekistani Som
VES	928	2	Venezuelan Bolivar Soberano
VND	704	0	Vietnamese Dong
VUV	548	0	Vanuatu Vatu
WST	882	2	Samoa Tala
XAF	950	0	CFA Franc BEAC
XAG	961	0	Silver

Code	Num	Min	Name
XAU	959	0	Gold
XCD	951	2	East Caribbean Dollar
XDR	960	0	Special Drawing Rights
XOF	952	0	CFA Franc BCEAO
XPD	964	0	Palladium
XPF	953	0	CFP Franc
XPT	962	0	Platinum
XTS	963	0	Test (ISO 4217 reserved)
YER	886	2	Yemeni Rial
ZAR	710	2	South African Rand
ZMW	967	2	Zambian Kwacha
ZWL	932	2	Zimbabwean Dollar

CLF is the only currency with 4 minor units. XTS is the ISO 4217 testing code; present in the table but should not appear in production data.

## 5.3 Cryptocurrencies

50 codes occupying `value_base_unit_t` slots **298 ... 347** (`BNV_CURRENCY_CRYPT0_FIRST ... BNV_CURRENCY_CRYPT0_LAST`). Like the fiat codes they have no named `bu_*` enumerators — resolved by `bnv_parse_currency_str`, queried with `bnv_unit_is_crypto` / `bnv_currency_info`. `numeric_code = 0` for all.

**Min** = `minor_unit` = on-chain decimal places. E.g. `<uint:64,$BTC>` stores satoshis; divide by  $10^8$  to obtain BTC.

Code	Min	Subunit	Name
BTC	8	satoshi	Bitcoin
ETH	18	wei	Ethereum
SOL	9	lamport	Solana
XRP	6	drop	XRP
BNB	18	—	BNB
ADA	6	lovelace	Cardano
LTC	8	—	Litecoin
DOT	10	planck	Polkadot
XMR	12	piconero	Monero

Code	Min	Subunit	Name
ETC	18	—	Ethereum Classic
BCH	8	—	Bitcoin Cash
XLM	7	stroop	Stellar
FIL	18	—	Filecoin
ICP	8	—	Internet Computer
TRX	6	—	TRON
EOS	4	—	EOS
VET	18	—	VeChain
NEO	8	—	Neo
ZEC	8	—	Zcash
UNI	18	—	Uniswap
ARB	18	—	Arbitrum
SUI	9	—	Sui
TON	9	—	Toncoin
INJ	18	—	Injective
SEI	6	—	Sei
APT	8	—	Aptos
TAO	9	—	Bittensor
WIF	6	—	dogwifhat
DOGE	8	koinu	Dogecoin
LINK	18	—	Chainlink
USDT	6	—	Tether
USDC	6	—	USD Coin
AVAX	18	—	Avalanche
ATOM	6	—	Cosmos
POL	18	—	Polygon
NEAR	24	—	NEAR Protocol
ALGO	6	—	Algorand
HBAR	8	—	Hedera
AAVE	18	—	Aave
MKR	18	—	Maker
DAI	18	—	Dai
STX	6	—	Stacks
GRT	18	—	The Graph

Code	Min	Subunit	Name
LDO	18	—	Lido DAO
BONK	5	—	Bonk
PEPE	18	—	Pepe
SHIB	18	—	Shiba Inu
JUP	6	—	Jupiter
PYTH	6	—	Pyth Network
RUNE	8	—	THORChain

## 5.4 Currency Prefix Rules

All 24 SI prefixes are allowed on all currency units. IEC binary prefixes are forbidden on all currencies ( `error_unit_illegal` ).

Example	Meaning
k~USD	thousands of USD ( $\times 10^3$ )
M~EUR	millions of EUR ( $\times 10^6$ )
G~ETH	giga-ETH = Gwei scale ( $\times 10^9$ )
m~USD	milli-USD = one tenth of a cent ( $\times 10^{-3}$ )

## 6. Symbol Disambiguation

As of spec 1.0 a currency is written **only** with the `$` sigil (§5.1), so the bare form is always a physical-unit lookup and the namespaces never collide:

Token	Bare form (no <code>\$</code> )	<code>\$</code> -sigil form
cup / CUP	cup → US cup ( <code>bu_cup</code> ); CUP → <code>error_unit_illegal</code>	\$CUP → Cuban Peso (ISO 4217:192)
BTU	BTU → BTU ( <code>bu_btu</code> ); Btu , btu also accepted	(not ISO 4217)
SOL	SOL → <code>error_unit_illegal</code>	\$SOL → Solana (crypto)
BAR	BAR → <code>error_unit_illegal</code> ; use lowercase bar	(not ISO 4217)
ERG	ERG → <code>error_unit_illegal</code> ; use lowercase erg	(not ISO 4217)
CAD , XAU	<code>error_unit_illegal</code> (no physical unit)	\$CAD → Canadian Dollar; \$XAU → Gold (X-code)

No bare token is simultaneously a valid physical unit and a currency: currencies live entirely under `$` , physical units entirely without it.

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*Physical unit enum range: 1-133, 348-367, 368-371, and 372-377 (163 total) · Fiat: 134-297 (164) · Crypto: 298-347 (50)* `BVN_VALUE_BASE_UNIT_COUNT` = `378 ( bu_ppb + 1 )`