

## D. Tables

**Table 1 Units with special names and symbols<sup>1</sup>**

ALL VALUES DECIMAL

Unit Category		Dimension	The Universal Unit Systems			
			with the Rydberg constant(u)		Harmonic System ( $\pm$ )	
Coherent	base units that are not natural units	length	$_{\text{u}}\text{m}$	272.102883 mm	$\pm \text{h}^2$	272.352206 mm
		time	$_{\text{u}}\text{s}$	390.267520 ms	$\pm \text{n}$	390.625115 ms
		energy	$_{\text{u}}\text{J}$	64.143275 mJ	$\pm \text{J}$	64.084556 mJ
		temperature <sup>3</sup>	$_{\text{u}}\text{K}$	58.441041 $\mu\text{K}$	$\pm \text{K}$	58.387542 $\mu\text{K}$
	base units that are natural units	plane angle	rad	(2/ $\pi$ ) arc sin(1)		
		logarithm	neper	log(e)		
		amount of substance	$_{\text{u}}\text{mol}$ or $N_{\text{A}}^{-1}$	mol / 6.02214076 $\times 10^{23}$ . In this context ‘ $_{\text{u}}$ ’ is equivalent to ‘3-’ and $_{\text{u}}\text{mol}$ is called ‘natural mol.’		
		impedance	$_{\text{u}}\Omega$ or $Z_{\text{P}}$	29.979245796 $\Omega$ (=1sr/( $\epsilon_0 c_0$ ) <sup>4</sup> ) $_{\text{u}}\Omega$ is called ‘natural ohm’ or more simply ‘nohm.’		
	derived units of electromagnetic quantities	charge	$\pm \text{C}$	28.896578 mC (is called ‘universal Coulomb’ (or ‘Clio’ <sup>6</sup> ))		
		electric current	$_{\text{u}}\text{A}$	74.043001 mA	$\pm \text{A}$	73.975219 mA
		field strength	$_{\text{u}}\text{E}$ <sup>5,6</sup>	272.113988 mA/m	$\pm \text{E}$	271.616007 mA/m
		flux density	$_{\text{u}}\text{T}$	390.283447 mC/m <sup>2</sup>	$\pm \text{T}$	389.569211 mC/m <sup>2</sup>

<sup>1</sup> Please see also <http://www.asahi-net.or.jp/~dd6t-sg/univunit-e/units.pdf> for details. A web-based unit converter is available at <http://hosi.org/cgi-bin/conv.cgi>. This converter also teaches us the representation of units that belong to various unit systems.

<sup>2</sup> ‘harmon’( $\pm \text{h}$ ), ‘nic’( $\pm \text{n}$ ), ‘looloh’<sup>8</sup>( $\pm \text{l}$ , ‘l’ can also be a cursive ‘ $\ell$ ’ (x2113)), and ‘nohm’( $_{\text{u}}\Omega$ ) constitutes a quartet. These are the alias for common use.

<sup>3</sup> The unit of thermodynamic temperature has been changed. The new unit is one-1,0000;<sup>th</sup> of the old unit in the paper <http://dozenal.com> along with the introduction of the Earth local extension.

<sup>4</sup> If we adopt the elementary charge as one of the definition constants,  $\pm \Omega$  is used in substitution for  $_{\text{u}}\Omega$ .

<sup>5</sup> See electromagnetic units in Appendix E and §3.2.2 of the paper <http://dozenal.com>, and <http://www.asahi-net.or.jp/~dd6t-sg/univunit-e/electromagnetism.pdf>.

<sup>6</sup> The unit symbol E (Ørsted) is associated with the CGS system. In this paper, we adopt metric unit names based on the scientists’ names as is.

However, under the Harmonic System, an alternative proposal suggests replacing these units with the names of Muses bearing the same initials — namely, Newton→**Nete**, Pascal→(Polymnia→)**Polym**, Coulomb→**Clio**, Ampere→**Aoide**, Ørsted→**Erato**, Tesla→**Thalia**, and Kelvin→**Kalliope**. This proposal has two advantages: (1) it does not honor any individual, and (2) it allows the omission of redundant ‘harmonic’ terms. The unit converter for this proposal is available at [http://hosi.org/cgi-bin/conv\\_muse.cgi](http://hosi.org/cgi-bin/conv_muse.cgi).

This proposal also renames units for which no corresponding Muse is found, such as Joule→**Juno**, Watt→(Walküre→)**Walku**, naper→(Nephelē→)**nephe**, dirac→**diana**, and  $\Omega\text{hm}$ → **$\Omega$ (Omega)**. Since no suitable Muse exists for Joule, Watt, or naper, the proposal instead borrows names from Roman, Norse, and Greek mythology. Moreover, because of the electromagnetic symmetry required to pair  $_{\text{u}}\Omega$  and  $\Omega_2$  (see the 3<sup>rd</sup> part of p.14), ‘ $\Omega$  (Omega)’ is adopted without a Muse equivalent.

	derived units of dynamical quantities	mass	$_{\text{u}}\text{g}$	131.950082 g	$\pm 1$ (x006C)	131.829289 g
		power	$_{\text{u}}\text{W}$	164.357196 mW	$\pm \text{W}$	164.056415 mW
		force	$_{\text{u}}\text{N}$	235.731701 mN	$\pm \text{N}$	235.300301 mN
		Pressure	$_{\text{u}}\text{P}$	3.183843 Pa	$\pm \text{P}$	3.172201 Pa
Non-coherent	defining constants	wave number	$R_{\infty}$	10,973,731.568157/m ( is called ‘Rydberg’)		
		velocity	$c_0$ or $_{\text{h}}\gamma$	299,792,458 m/s (defined, and is called ‘light’)		
		action	$\hbar$	$6.62607015 \times 10^{-34} \text{ J s} / 2\pi$ ( is called ‘quantum’)		
		heat capacity	$k_{\text{B}}$	$1.380649 \times 10^{-23} \text{ J/K}$ ( is called ‘Boltzmann’)		
	supplementary constants	the total solid angle of a hypersphere	$\Omega_k$	$\frac{2\pi^{\frac{k+1}{2}}}{\Gamma(\frac{k+1}{2})} \text{ rad}^k$ $k=0,1,2$ $\Omega_0=2$ $\Omega_1=2\pi \text{ rad}$ ( is called ‘cycle’) $\Omega_2=4\pi \text{ sr}$ ( is called ‘turn’)		
		logarithm of an integer	$f_k$	$\log(2^k)$ $k=1$ (bit), $d$ (figure), $4$ (nibble), $8$ (byte), .. $d=\log_2(12.)$		
		amount of substance	$\pm \text{mol}$	$132.007620 \text{ mol}$ $(=12.^{24} / N_{\text{A}})$ $(\pm \text{mol}$ is called ‘universal mol’)		
		elementary charge	$e$	$1.6021766340 \times 10^{-19} \text{ C}$ $(e$ is called ‘electron’) $(=\sqrt{\frac{ah}{\Omega_n}})$		

**Table 2 Physical, material and astronomical constants<sup>7</sup>**

ALL VALUES DOZENAL

Constant Symbols and Name (UNDERLINE INDICATES CONSTANT MAINTAINS SAME VALUE BETWEEN SYSTEMS u AND h)		Constant Value expressed by the Universal Unit Systems		Expone nt $N$ of $\times 10^N$	Unit Symbol (u and h prefixes omitted)
		with the Rydberg constant (u)	Harmonic System (h)		
$R_{\infty}$	Rydberg constant	1	1;00170000	6;	$\Omega_1/\text{m}$
$c_0$	<u>the speed of light in vacuum</u>	1		8;	m/s
$\hbar$	<u>quantum of action</u>	1		-26;	J s
$k_{\text{B}}$	<u>Boltzmann constant</u>	1		-20;	J/K
$N_{\text{A}}$	<u>Avogadro constant</u>	1		20;	$\text{mol}^{-1}$
$R$	<u>gas constant</u>	1		0;	J/(mol K)
$u$	unified atomic mass unit	1;00090610	1;00240733	-20;	$\text{g}^8$
$a_{\text{B}}$	Bohr Radius	1;005E85684	1;00447X74	-9;	m
$\alpha$	<u>fine structure constant</u>	1;0739940472		-2;	-

<sup>7</sup> If CODATA (2022) values are required, see <http://physics.nist.gov/cuu/Constants/index.html> .

<sup>8</sup> Because  $_{\text{u}}\text{g}$  is approximately  $100^{10}$ ;  $u$ , I add alias name ‘looloh’ ( $\text{l}\acute{\text{u}}:\text{lo}\text{u}:\text{ə}\text{u}$ ,  $\pm 1$ ) to mass unit of the Harmonic System.

$e$	<u>elementary charge</u>	1;0374439E14		-14;	C
$m_e$	electron mass	0;E4692217E0	0;E48324X245	-23;	g
$\sigma$	<u>Stefan-Boltzmann constant</u>	1;E82E28		-1E;	W/(m <sup>2</sup> K <sup>4</sup> )
$m_G$	gravitic meter ( $\sqrt{2E}; l_P$ )	1;00186	1;00016	-27;	m
$l_P$	Planck length	2;0445E	2;04134	-28;	m
$F_P$	Planck force ( $hc_0/l_P^2$ )	2;XE206	2;XEE32( $\div 2;E$ ) <sup>9</sup>	35;	N
$G$	Newtonian constant of gravitation ( $c_0^4/F_P$ )	4;15768	4;14663	-X;	(m <sup>4</sup> /s <sup>4</sup> )/N
$\theta_W$	<u>weak mixing angle</u>	E;304		-2;	$\Omega_1$
$V_m$	molar volume of an ideal gas under standard conditions	1;02X469	1;025665	2;	m <sup>3</sup> /mol
	black-body radiation at the ice point	0;EX2466	0;EX8784	2;	W/m <sup>2</sup>
	maximum density of water	1;088183	1;092X47 ( $\div 15;14;$ )	2;	g/m <sup>3</sup>
	density of ice at the ice point	0;E7E9	0;E85E	2;	g/m <sup>3</sup>
	specific heat of water <sup>10</sup>	0;6052	0;6045 ( $\div 1/2$ )	0;	J/(g K)
	surface tension of water at 25°C	0;EE68	0;EEE4	-1;	N/m
atm	standard atmosphere	1;65008E	1;659967 ( $\div 1;66$ )	4;	P
$g_n$	standard gravitational acceleration	5;5X54XE9	5;5E21264 ( $\div E;2$ )	0;	m/s <sup>2</sup>
$r_E$	gravitational radius of Earth	2;41E8982X0X	2;418030652	-2;	m
au	astronomical unit	8;X67575535	8;X55509X31	X;	m
	<u>astronomical unit</u>	9;E91731X53		-3;	$c_0$ s <sub>E</sub> day

**Table 3 Power prefixes**

name	symbol	TeX text	value	name	symbol	TeX text	value
dirac <sup>11</sup>	$\nabla\#$	dirac	10;				
<b>hyper</b>	$\#$ (x266F)	hyper	<b>10;<sup>4</sup></b>	<b>sub</b>	$\flat$ (x266D)	sub	<b>10;<sup>-4</sup></b>
<b>cosmic</b>	+	$\_+$	<b>10;<sup>8</sup>(=U)</b>	<b>atomic</b>	-	$\_-$	<b>U<sup>-1</sup></b>
di-cosmic	2+	$\_{2+}$	U <sup>2</sup>	di-atomic	2-	$\_{2-}$	U <sup>-2</sup>
ter-cosmic	3+	$\_{3+}$	U <sup>3</sup>	ter-atomic	3-	$\_{3-}$	U <sup>-3</sup>
tetra-cosmic	4+	$\_{4+}$	U <sup>4</sup>	tetra-atomic	4-	$\_{4-}$	U <sup>-4</sup>
penta-cosmic	5+	$\_{5+}$	U <sup>5</sup>	penta-atomic	5-	$\_{5-}$	U <sup>-5</sup>
hexa-cosmic	6+	$\_{6+}$	U <sup>6</sup>	hexa-atomic	6-	$\_{6-}$	U <sup>-6</sup>
hepta-cosmic	7+	$\_{7+}$	U <sup>7</sup>	hepta-atomic	7-	$\_{7-}$	U <sup>-7</sup>

<sup>9</sup> If this is expressed as 2;E, the error from CODATA (2018) becomes -6;61(-6.51) times standard deviation.

<sup>10</sup> This corresponds to the definition of the thermodynamic calorie.

<sup>11</sup> ‘dirac’ is only used when expressing the unit of the Gravitic System with the Harmonic System. (i.e., gravitic meter = tetra-atomic dirac harmon, gravitic second = penta-atomic dirac nic, gravitic gram = atomic dirac looloh)

**Table 4 Examples of natural scale quantity representation <sup>12</sup>**

quantity	symbol	value	refer to
2E; penta-cosmic Newton	2E; <sub>5+N</sub>	2E; $\times U^5$ [harmonic] Newton	the Planck force
6;di-cosmic nic	6; <sub>2+n</sub>	6; $\times U^2$ [harmonic]nic[second]	the age of the universe
cosmic hyper bit [Boltzmann]	+ <sub>#</sub> f <sub>1</sub> [ <i>k<sub>B</sub></i> ]	U <sup>1@4</sup> log2 <sup>1</sup> [Boltzmann]	1.01 Tera Byte(=2 <sup>43</sup> .bit)
cosmic harmon	+h	U <sup>1</sup> harmon[ic meter]	the speed of light in vacuum
ato[mic ][light]	- $\gamma$	harmon[ic meter]/ [harmonic]nic[second]	U <sup>-1</sup> light( $\div 2.51$ km / hour)
atomic uninol[ ][h[armon]	1; '[0].h <sup>13</sup>	U <sup>-1@1</sup> harmon[ic meter]	the Bohr radius
di-atomic Coulomb	<sub>2</sub> .C	U <sup>-2</sup> [universal] Coulomb	the elementary charge
di-atomic effective Watt <sup>14</sup>	<sub>2</sub> . $\bar{W}$	U <sup>-2</sup> [harmonic]effective Watt	a photon power (540.THz)
ter-atomic looloh	<sub>3</sub> .l	U <sup>-3</sup> looloh	the unified atomic mass unit
2; tetra-atomic harmon	2; <sub>4</sub> .h	2; $\times U^{-4}$ harmon[ic meter]	the Planck length

**Table 5 The Earth local extension for the Harmonic Universal Unit System**

category		name / description	symbol	plain text	value												
Non-coherent calendar time	units	year	☼ <sub>(x263C)</sub>	year	☼ =365.days 31.nodus (265; <sup>26</sup> 27; ☼)												
		month	☾ <sub>(x263D)</sub>	month	☾ =10; <sup>-1</sup> ☼												
		day	☽ <sub>(x00B0)</sub>	day	Ω <sub>1</sub> =1 <sup>26</sup> =10; <sup>7</sup> =100; <sup>7</sup> =1000; <sup>7</sup> <sup>13</sup>												
		unino day dino day terno day (tertiary 12 divisions of one day)	$\tilde{\gamma}$ <sub>(x2032)</sub> $\tilde{n}$ <sub>(x2033)</sub> $\tilde{m}$ <sub>(x2034)</sub>	unitia ditia tertia	‘day’ corresponds to 86,400. s at the beginning of year 1900. <b>Each calendar time unit symbol is distinguished from existing systems by adding a tilde (“~”,x0303) or by superscripting the symbol itself.</b>												
		nodus	★ <sub>(x2606)</sub>	nodus	<sup>26</sup> =2 <sup>+7</sup> ★												
		terno nodus→terno n <sub>(odus)</sub> →ternon	▽ <sub>(x25BD)</sub>	ternon	▽ =10; <sup>-3</sup> ★												
		hexaon nodus→hex <sub>(a)O(n)</sub> n <sub>(odus)</sub> →hexon	⬢ <sub>(x232C)</sub>	hexon	⬢ =2 <sup>+6</sup> ☼ =1;003628×10; <sup>+6</sup> ★												
Non-coherent unit and constants		difference between thermodynamic temperature and <i>T<sub>E</sub></i> (=118,2354; <sub>±</sub> K (-74.36°C,-101.85°F))	°H	deg H	1,0000; <sub>±</sub> K(÷1.210724 K ÷ 23./19. K)												
		approximate formula			<table><tr><td>100; 0000°H</td><td>is</td><td>99.9839 °C</td></tr><tr><td>78;0000°H</td><td>is</td><td>37.0262°C</td></tr><tr><td>61;0000°H</td><td>is</td><td>14.0224°C</td></tr><tr><td>51;5026°H</td><td>is</td><td>0.0000°C</td></tr></table>	100; 0000°H	is	99.9839 °C	78;0000°H	is	37.0262°C	61;0000°H	is	14.0224°C	51;5026°H	is	0.0000°C
		100; 0000°H	is	99.9839 °C													
		78;0000°H	is	37.0262°C													
61;0000°H	is	14.0224°C															
51;5026°H	is	0.0000°C															
$\text{°C} = \frac{1E}{17}; \text{°H-62;4}$ $\text{°H} = \frac{17}{1E}; \text{°C} + 51;5$			99.9839 °C is the boiling point of water at the standard atmosphere.														
supple-mentary constants	the gravitational acceleration of the Earth (is called ‘gee [of Earth] ’)	<i>g<sub>E</sub></i>	<i>g<sub>E</sub></i> or gee	5;611X615 harmon/nic <sup>2</sup> <i>g<sub>E</sub></i> is defined as <i>c</i> <sub>0</sub> <sup>2</sup> <i>r<sub>E</sub></i> ( <i>m<sub>E</sub></i> rad) <sup>-2</sup>													
	the rotation period of the Earth (is called ‘[Earth] solar’) at the beginning of year 1900.	<i>s<sub>E</sub></i>	<i>s<sub>E</sub></i> or solar	0;EEEEEE15336X nic/ ternon (This should be ‘coordinated’.)													
	the meridian length of the Earth (is called ‘[Earth] meridian’)	<i>m<sub>E</sub></i>	<i>m<sub>E</sub></i> or meridian	4124,216E; harmon/Ω <sub>1</sub>													

<sup>12</sup> The part enclosed with '['' can be omitted in Table 4 and Table 5.

<sup>13</sup> This is the notation explained at the end of Appendix C.

$\bar{W}$  corresponds to 1;di-cosmic photon energy(540.THz) / nic and 115.667212 lumen.

<sup>14</sup> Human sensitivity weighted units are indicated by 'effective' and symbolled by  $\overline{\text{effective}}$ .

$\bar{W}$  corresponds to 1;di-cosmic photon energy(540.THz) / nic and 115.667212 lumen.