




SPIRE-ALC-COM-001501

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	Date 20/01/03	Référence HP-ASPI-LT-2568

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Object : Herschel / Planck - Calibration

REF1 : HP-ASPI-LT-2562 dated 20/12/02 - "Herschel / Planck - HPSDB - AI#2165-09

Dear Sir,

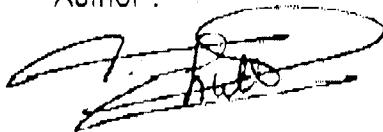
In the frame of the Herschel / Planck system data base (HPSDB), we will check the units of parameters and curves against predefined authorised units table. Find attached REF1 in which are defined those allowed units.

In order to facilitate the integration of your data (compatible SCOS) in our system data base for module and system tests, we require you, as far as possible, to use the units as proposed in REF1.

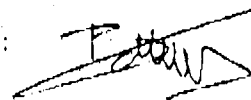
In case you need to use different units, let us know, we will add those units in the table.

Best regards.

Author :



Authorised by :



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M051-1

REF 1

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Object : Herschel / Planck - HPSDB - AI#2165-09

Dear Ricardo,

Please find enclosed the ASP answer to the referenced AI : **"ASP to give the list of units to set up the unit table"**.

The following table is a customisation for Herschel / Planck project of an ESA draft table applicable to PLUTO. This customisation has been done according to following rules :




- Limitation to 4 characters (for SCOS compatibility),
- Suppression of some non SI units,
- Suppression of useless units
- Limitation on number of symbol to one,
- Changes (when the units do not look appropriate).

This table applies only for items used by SCOS (parameters, curves, ...) and HPSDB application will check it, but it does not applies for items which are not used by SCOS (constants (flight dynamics data, ...), ...).




The naming convention will be updated accordingly to include this table.

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MOS1-1

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Quantity	SI unit	Definition	HPSD Symbol	Supported multiples and submultiples of the unit
length	metre	base unit	"m"	"km" "cm" "mm" "um" "nm" "pm"
	astronomical unit	1 AU = 149597.870 · 10 ⁶ m	"AU"	
AREA	m ²	1 m ² = 1 m · m	"m2"	"km2" "dm2" "cm2" "mm2"
volume	m ³	1 m ³ = 1 m · m · m	"m3"	"dm3" "cm3" "mm3"
	litre	1 l = 1 dm ³	"l"	"hl" "cl" "ml"
mass	kilogram	base unit	"kg"	"g" "mg" "ug"
time	second	base unit	"s"	"ms" "us" "ns"
	minute	1 min = 60s	"min"	
	hour	1 h = 60 min	"h"	
	day	1 d = 24 h	"d"	
electric current	ampere	base unit	"A"	"kA" "mA" "uA" "nA" "pA"
temperature	kelvin	base unit	"K"	
	degree Celsius	1°C = 1 K + 273.15	"degC"	
plane angle	radian	supplementary unit = m/m	"rad"	"mrad" "urad"
	degree	1° = π/180 rad	"deg"	
solid angle	steradian	supplementary unit = m ² /m ²	"sr"	
frequency	hertz	1 Hz = 1 s ⁻¹	"Hz"	"THz" "GHz" "MHz" "kHz"
rotational freq.	s ⁻¹		"1/s"	"rpm"
force	newton	1 N = 1 kg m/s ²	"N"	"MN" "kN" "mN" "uN"
pressure	pascal	1 Pa = 1 N/m ²	"Pa"	"GPa" "MPa" "kPa" "mPa" "uPa"
	bar	1 bar = 10 ⁵ Pa	"bar"	"mbar" "ubar"




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Quantity	SI unit	Definition	HPSD Symbol	Supported multiples and submultiples of the unit
energy, work, heat	joule	$1 \text{ J} = 1 \text{ N m}$	"J"	"TJ" "GJ" "MJ" "kJ" "mJ"
torque	Nm	$1 \text{ Nm} = 1 \text{ N m} = 1 \text{ J}$	"Nm"	"MNm" "kNm" "mNm" "uNm"
power	watt	$1 \text{ W} = 1 \text{ J/s}$	"W"	"GW" "MW" "kW" "mW" "uW"
electric charge	coulomb	$1 \text{ C} = 1 \text{ A s}$	"C"	"MC" "kC" "mC" "uC" "nC" "pC"
	Ah	$1 \text{ Ah} = 3.6 \text{ kC}$	"Ah"	"mAh" "uAh"
electric potential	volt	$1 \text{ V} = 1 \text{ J/C}$	"V"	"MV" "kV" "mV" "uV"
electrical capacitance	farad	$1 \text{ F} = 1 \text{ C/V}$	"F"	"mF" "uF" "nF" "pF"
electrical resistance	ohm Ω	$1 \text{ W} = 1 \text{ V/A}$	"Ohm"	"GOhm" "MOhm" "kOhm" "mOhm"
electrical conductance	siemens	$1 \text{ S} = 1 \text{ W}^{-1}$	"S"	"kS" "mS" "uS"
magnetic flux	weber	$1 \text{ Wb} = 1 \text{ V s}$	"Wb"	"mWb"
magnetic induction	tesla	$1 \text{ T} = 1 \text{ Wb/m}^2$	"T"	"mT" "uT" "nT"
inductance	henry	$1 \text{ H} = 1 \text{ Wb/A}$	"H"	"mH" "uH" "nH" "pH"
velocity	m/s		"m/s"	
angular velocity	rad/s		"rd/s"	
	deg/s		"dg/s"	"dg/m" "dg/h"
acceleration	m/s^2		"m/s ² "	
linear mass density	kg/m		"kg/m"	"mg/m"
momentum	kg m/s		"Ns"	
angular momentum	$\text{kg m}^2/\text{s}$		"Nms"	
moment of inertia	kg m^2		"kgm ² "	

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FAX

Quantity	SI unit	Definition	HPSD Symbol	Supported multiples and submultiples of the unit
viscosity	Pa s		"Pas"	"mPas"
volume flow rate	m ³ /s		"m3/s"	"l/s"
surface tension	N/m		"N/m"	"mN/m"
linear expansion coefficient	K ⁻¹		"1/K"	
heat capacity	J/K		"J/K"	"kJ/K"
charge density	C/m ³		"C/m3"	
surface density of charge	C/m ²		"C/m2"	
electric field strength	V/m		"V/m"	"MV/m" "kV/m" "mV/m" "uV/m"
permittivity	F/m		"F/m"	"uF/m" "nF/m" "pF/m"
electric polarization	C/m ²		"C/m2"	
electric dipole moment	C m		"Cm"	
current density	A/m ²		"A/m2"	
linear current density	A/m		"A/m"	"A/mm"
magnetic vector potential	Wb/m		"Wb/m"	
permeability	H/m		"H/m"	"uH/m" "nH/m"
electromagnetic moment	A m ²		"A m2"	
magnetization	A/m		"A/m"	"A/mm"
magnetic dipole moment	Wb m		"Wb m"	
conductivity	S/m		"S/m"	"MS/m" "kS/m"
reluctance	H ⁻¹		"1/H"	

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Quantity	SI unit	Definition	HPSD Symbol	Supported multiples and submultiples of the unit
radiant intensity	W/sr		"W/sr"	
irradiance	W/m ²		"W/m ² "	
mechanical impedance	N s/m		"Ns/m"	
TRANSMISSION RATE	bps		"bps"	"kbps" "Mbps" "Gbps"
SIGNAL LEVEL	dbW		"dbW"	"dbmW"




Table A-1 Acceptable multiples and submultiples of engineering units

Factor	Name	Symbol	Factor	Name	Symbol
10 ²⁴	yotta	Y	10 ¹	deci	d
10 ²¹	zetta	Z	10 ⁻²	centi	c
10 ¹⁸	exa	E	10 ⁻³	milli	m
10 ¹⁵	peta	P	10 ⁻⁶	micro	u
10 ¹²	tera	T	10 ⁻⁹	nano	n
10 ⁹	giga	G	10 ⁻¹²	pico	p
10 ⁶	mega	M	10 ⁻¹⁵	femto	f
10 ³	kilo	k	10 ⁻¹⁸	atto	a
10 ²	hecto	h	10 ⁻²¹	zepto	z
10 ¹	deca	da	10 ⁻²⁴	yocto	y

For information only, the following changes have been done against the ESA draft table applicable to PLUTO :

. Compatibility with SCOS (limitation to 4 characters)

. Angular velocity	/ rad/s	/"rad/s"	=> "rd/s"
. Angular velocity	/ deg/s	/"deg/s"	=> "dg/s"
		"deg/sec"	=> removed
		"deg/min"	=> "dg/m"
		"deg/h"	=> "dg/h"
		"deg/hr"	=> removed
. moment of inertia	/ kg m ²	/"kg m ² "	=> "kgm ² "
. viscosity	/ Pa s	/"Pa s"	=> "Pas"
. mechanical impedance	/ N s/m	/"N s/m"	=> "Ns/m"




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. Suppression of some non SI units (in order to limit potential conversion errors), however some of them are kept because frequently used (litre, deg°C, degree, bar, ...) or as multiple or sub-multiple :

. Length	/ parsec	/ "pc"
. Mass	/ atomic mass unit	/ "u"
. Mass	/ tonne	/ "t"
. Energy, work, heat	/ electron volt	/ "eV"
. velocity	/ km/h	/ "km/h"
. velocity	/ knot	/ "knot"

. Suppression of useless units (referring to temperature differences, moles, candela, ...):

. temperature difference	/ kelvin	/ "K"
. amount of substance	/ mole	/ "mol", "kmol", "mmol", "umol"
. liminosity	/ candela	/ "cd"
. luminoux flux	/ lumen	/ "lm"
. illuminance	/ lux	/ "lx"
. activity (of a radionucleide)	/ becquerel	/ "Bq"
. absorbed dose	/ gray	/ "Gy"
. dose equivalent	/ sievert	/ "Sv"
. specific acoustic impedance	/ Pa s/m	/ "Pa s/m"
. acoustic impedance	/ Pa s/m ³	/ "Pa s/m ³ "
. kinematic viscosity	/ m ² /s	/ "M ² /s"
. quantity of light	/ lm s	/ "lm s"
. Luminance	/ cd/m ²	/ "cd/m ² "
. luminous exitance	/ lm/m ²	/ "lm/m ² "
. light exposure	/ lx s	/ "lx s"
. luminous efficacy	/ lm/W	/ "lm/W"
. molar mass	/ kg/mol	/ "kg/mol", "g/mol"
. molar volume	/ m ³ /mol	/ "m ³ /mol", "l/mol"
. molar internal energy	/ J/mol	/ "kJ/mol"
. molar heat capacity	/ J/(mol K)	/ "J/(mol K)"
. concentration of substance B	/ mol/m ³	/ "mol/m ³ "
. molarity of solute substance B	/ mol/kg	/ "mol/kg"
. density	/ kg/m ³	/ "kg/m ³ ", "kg/l", "g/l"
. linear mass density	/ kg/m	/ "kg/m", "mg/m"
. thermal conductivity	/ W/(m K)	/ "W/(m K)"
. coefficient of heat transfer	/ W/(m ² K)	/ "W/(m ² K)"
. specific heat capacity	/ J/(kg K)	/ "J/(kg K)"
. specific internal energy	/ J/kg	/ "MJ/kg", "kJ/kg"
. electric polarization	/ C/m ²	/ "kC/m ² ", "mC/m ² ", "uC/m ² "
. current density	/ A/m ²	/ "A/mm ² "
. resistivity	/ Ω m	/ "Ohm m", "GOhm m", "KOhm m", "mOhm m"
. radiance	/ W/(sr m ²)	/ "W/(sr m ²)"

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. Limitation of number of symbol to one :

. volume	/ litre	/"L"	=> removed
. time	/ second	/"sec"	=> removed
. time	/ hour	/"hr"	=> removed
. time	/ day	/"day"	=> removed

. Changes :

. temperature	/ kelvin	/"kabs"	=> "K"
. Rotational frequency	/ S ⁻¹	/"1/min"	=> "rpm"
. momentum	/ N.s	/"kg m/s"	=> "Ns"
. angular momentum	/ N.m.s	/"kg m2/s"	=> "Nms"

This fax closes the referenced action item.

Best regards.

Author :

Authorised by :