Description of the Engineering Data Exchange Excel Template

Engineering Data Exchange Template for BACnet Systems

"Description of the EDE Data Fields"
Version of Layout: 2.3

Release Date: January 16, 2017

600-10 SPÉCIFICATION EDE

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MODIFICATIONS AU TEXTE DE LA SPÉCIFICATION EDE BIG DE MANIÈRE À CORRESPONDRE AUX IMPÉRATIFS DU CHUV

1) Les champs de renseignement suivants marqués pour certains comme optionnels dans la spécification sont obligatoires dans le document EDE CHUV (voir exemple sous 600-7).

   - description
   - present-value-default
   - min-present-value
   - max-present-value
   - commandable
   - supports COV
   - hi-limit
   - low-limit
   - state text reference
   - unit-code
   - Fonction ISO 7-1
   - Fonction ISO 7-2

2) Le champ "description" doit pouvoir comprendre 128 caractères au minimum tant dans la feuille EDE que pour l'ensemble des objets BACnet qui y sont référencés.

3) Les textes et unités standard sont donnés à titre indicatif, et correspondent à la spécification EDE référencée, en langue anglaise. Toutefois, les textes mis en place dans le cadre des projets du CHUV seront en langue française, ils seront choisis, dans la mesure où ils existent, dans les textes standards indiqués dans la présente annexe. A défaut, des textes spécifiques au besoin du projet seront soumis pour validation à l'Atelier GTB joint aux soumis.

Purpose

In a multi-vendor system engineering data need to be exchanged between the interacting parties. From the BACnet point of view it is not really required to have data point lists, because data of object properties from any device can be discovered online using the appropriate BACnet services. But depending on the BACnet functionality supported by server device or client device, it may be necessary to provide this information as an offline data-point list. This may also be required, if the client needs to be set-up before the server device is operational on the network.

The Engineering Data Exchange (EDE) template shall help to exchange engineering data, such as data point types, data point addresses and special data point presentation information in a standardized form.
When integrating multi-vendor systems using the BACnet protocol, the actual protocol is described in the BACnet Standard. The extent of implementation is described in the PICS (Protocol Implementation Conformance Statement) of a BACnet device.

BACnet objects contain various object properties that can help in setting-up the engineering data which may be required for the configuration of a Supervisory Station or an Automation Station. However, many of these object properties are not mandatory on either the client side or on the server side.

Also, many clients (Supervisory Stations or Automation Stations) require ‘offline engineering’ of their databases.

The Engineering Data Exchange template shall provide a common means to describe the objects of a data point server in the form of a Microsoft ® Excel spreadsheet.

Known limitations

Although the EDE file was never intended to provide a machine-to-machine data-exchange format it is commonly used to import or export information and exchange this information between controllers and workstations.

It is known that except from the object-name and object instance number only the usual properties of object types like analog, binary and multistate objects (input, output and value) can be exchanged using the EDE file. Detailed information for other applications like fire-alarm systems using life-safety objects or access control using the set of Access-Control objects, etc. is outside the scope of the current EDE-specification and will likely not be available using the EDE-file format described hereinafter.

General Format

The actual Excel workspace consists of four different sheets:

1. The sheet "EDE" contains project information and also the list of data points selected for data exchange.

2. The sheet "State-Texts" contains information about the state texts being used for binary objects and multi state objects. The sheet "EDE" refers or "points" to entries in the sheet "State Texts".

3. The sheet "Unit-Texts" contains a list of supported BACnetEngineeringUnits being used for analog objects. The sheet "EDE" refers or "points" to entries in the sheet "Unit-Texts". Proprietary units may be added if required, according to the rules defined in the BACnet Standard.

4. The sheet "Object-Types" contains a list of supported BACnet Object Types. The sheet "EDE" refers or "points" to entries in the sheet "Object-Types". Proprietary object-types may be added if required, according to the rules defined in the BACnet Standard.

Once the assignment between the keyname, object-name, object-type and object-instance has been communicated to the integration partner, this assignment shall not be changed between subsequent versions of the reference file. New objects should be added at the end of the sheet and should have instance numbers which have not been used for that device yet.

Comment lines may be included in the sheets. A comment line starts with the ANSI character '#'.

Additional optional columns may be added if necessary. The column headers have to be unique.

The XLS/XLSX spreadsheet file is mainly intended for human interaction. To allow for machine-to-machine data exchange in projects, the CSV (Comma Separated Value) file format is preferred.

The Excel version, storage format, country setting and separator are to be negotiated between all vendors for their common project.

File Naming conventions

The table-names in the XLS/XLSX-file shall be as follows:
EDE
State-Texts
Unit-Texts
Object-
Types

The names of the CSV-files shall be assembled as follows:

Prefix:	**Name** agreed by the involved parties (e.g. the project name)	
Separator:	**_ Underscore**	
Suffix:	To uniquely identify the content, the suffixes shall	
	be **EDE**	-> identifies the main EDE table
	ObjTypes	-> identifies the object type table
	StateTexts	-> identifies the state texts used in Binary and Multistate objects
	Units	-> identifies the table of BACnet engineering
units Extension: **.csv**		-> identifies the file type

Example Project-Name: "SunsetTower"

Excel-File:	"SunsetTower.xls" or "SunsetTower.xlsx"
EDE-File:	"SunsetTower_EDE.csv"
Table ObjectTypes:	"SunsetTower_ObjTypes.csv"
Table StateTexts:	"SunsetTower_StateTexts.csv"
Table Units:	"SunsetTower_Units.csv"

Format Of The Sheet "EDE"

The Header

Project_Name

This field shall contain the project name and the location of the project.

Version_Of_Reference_File

This field shall contain the version of the reference file. This actually means the version of the data point list.

Time_Stamp_Of_Last_Change

This is the date and time of the last change of this document.

Author_Of_Last_Change

The full name of the author who did the last change to the document.

Version_Of_Layout

This is the version of the sheet layout that is used. The version of the layout should not change during a project. The description you are just reading is valid for layout version 2.3.

#Limited_Resources

This is an **optional comment field and as such not included** in the EDE template. If present, it should list limitations of the device such as:

- Maximum string length for keynames, descriptions and texts.
- Restrictions on address ranges (device object instances etc.)
- Special timing requirements

The Data Point Columns

keyname

The keyname is the system wide unique name of the data object, as it will be displayed on the client's user interface.
In best case the keyname is identical to the object-name, but different names are allowed. Differing names may be necessary for example, if an operator wants to see a special structured keyname that is longer than the supported length of the object-name, or, in cases where there are many devices with identical object-names on the same network (e.g. AI1, BO1).

This field is mandatory.

device-object-instance

The device-object-instance identifies the device which contains the object described in this row. BACnet device object instances must be unique within all connected BACnet networks (the "BACnet internetwork"). If the project is a multi vendor system with different vendors, a range of device instances may be assigned to each of them by the responsible system integrator.
The device object instance is the lower 22 bits (bit 0 through 21) of the Object_Identifier property of the Device Object.

It is represented as a decimal value with a valid range from 0 – 4194302.

This field is mandatory.

object-name

This is the name of the object being described and identical to the Object_Name property. Object names shall be unique within a BACnet device. The object-name of the device-object itself shall be unique within the entire BACnet internetwork.

This field is mandatory.

object-type

This field contains a decimal value that represents the BACnetObjectType as used in the Object_Type property.
The sheet "Object-Types" contains the text descriptions for all supported object-types.
This information is part of the Object_Identifier property (most significant 10 bits i.e. bit 22 through 31).

This field is mandatory.

object-instance

This field contains the instance-number of the object as a decimal value. It covers the lower 22 bits (bit 0 through 21) of the Object_Identifier property. Within a BACnet-device different objects of the same object-type are distinguished by their instance numbers. The object instance therefore shall be unique for each object-type in a specific device.

The valid range is from 0 – 4194302. This field is mandatory.

description

This information text provides more detailed description of the data point and its function.
It is often required for offline engineering.
The BACnet property Description is optional for a BACnet device, but should be identical to this entry, if present. Usually this text is taken from the VDI3814 point-list and is provided by the project design documents.

This field is optional.

present-value-default

The default value for the Present_Value property. If Present_Value is commandable, this field value shall be taken from the Relinquish_Default property.

This field is optional.

min-present-value

The minimum value that can be reliably obtained from or written to the Present_Value property.

If the Min_Pres_Value property exists in the referenced object, the value shall be taken from this property. If the Min_Pres_Value property does not exist in the referenced object, the value shall be specified by the allowed range of the application.

This field is optional.

max-present-value

The maximum value that can be reliably obtained from or written to the Present_Value property.

If the Max_Pres_Value property exists in the referenced object, the value shall be taken from this property. If the Max_Pres_Value property does not exist in the referenced object, the value shall be specified by the allowed range of the application.

This field is optional.

settable

This field indicates whether the writable Present_Value property is controlled by an automated process (device, Program) or can be set by a client.
The letter ‘Y’ means settable, the letter ‘N’ means not settable. Only properties which, by definition in the BACnet standard, are required to be writable or properties which can be prepared for write-access, can be settable. This is independent of whether write access is performed with or without priority management.
If the field is empty, the client will assume that the value may be read and set.
If a write request is issued by a client, but not permitted by the server, the server will respond with the appropriate Error-PDU.

This field is optional.

supports COV

This field indicates whether the object supports COV or not. The letter ‘Y’ or an empty field indicates that the object supports COV. The letter "N” means COV is not supported. This field is optional.

hi-limit

This is the upper alarm limit.

If the object supports intrinsic reporting and the High_Limit property is read-only, this field contains the value taken from the High_Limit property.
If the object supports intrinsic reporting and the High_Limit property is writable, this field shall be empty in order to indicate that the client may not rely on a fixed value as it may change during runtime.
If the object does not support intrinsic reporting, this field shall contain the value to be used for external monitoring for alarm conditions.

This field is optional.

low-limit

This is the lower alarm limit.

If the object supports intrinsic reporting and the Low_Limit property is read-only, this field contains the value taken from the Low_Limit property.
If the object supports intrinsic reporting and the Low_Limit property is writable, this field shall be empty in order to indicate that the client may not rely on a fixed value as it may change during runtime.
If the object does not support intrinsic reporting, this field shall contain the value to be used for external monitoring for alarm conditions.

This field is optional.

state text reference

This field is valid for binary and multi-state objects only.

The decimal values in this column are used as reference numbers referring to entries in the sheet "State-Text". Each entry within the "State-Text" sheet, identified by its reference number, offers an enumeration of state- texts which correspond directly to the possible values of the Present_Value property of the referencing object. Different objects listed in the "EDE" sheet may refer to the same entry in the "State-Text" sheet (use the same reference number) when their textual representations of Present_Value are identical.

This field is optional.

unit-code

This field is valid for analog and loop objects only.

The field contains a decimal value that represents the BACnetEngineeringUnits code taken from the corresponding Units property. In the "Unit-Text" sheet, the text descriptions for all supported unit codes can be found as human readable text.

This field is optional.

vendor-specific-address

This field may be used to identify addresses used in the server device (like terminal numbers). The address may provide an internal data-point-identification or reference.

This field is optional.

notification-class

This field contains the instance number of the notification_class object linked to the referenced object. If the object does not support intrinsic reporting, this field shall be empty.

This field is optional.

Format of the "State-Texts" sheet

This sheet consists of a number of rows, each identified by its reference number, listing an enumeration of state texts for multi-state objects (Text 1 …Text n) or for binary objects (only Inactive-Text and Active-Text). Multi-State- and Binary-Texts shall not be mixed under one reference number i.e. in the same row. The row contains therefore either the list "Inactive-Text, Active-Text" or "Text1, Text2, Text3,…".
The values of the reference numbers identifying the rows can be freely chosen by the creator of the document but shall be unique within this sheet.

For unused or not supported states the appropriate column is left empty. The "State-Text"sheet may contain more rows than actually referenced in a project to allow reuse of this sheet in other projects.

The "EDE" sheet refers to entries in the "State-Texts" sheet identified by their specific reference numbers. The "EDE" sheet and the "State-Texts" sheet must be maintained in a consistent manner.

Format of the "Unit-Texts" sheet

This sheet contains the unit texts for all BACnetEngineeringUnits codes and for all proprietary units being used in the project. The first column contains the unit code, the second column contains the associated text.

The "EDE" sheet refers to the unit code as indicated in the first column of the "Unit-Texts" sheet. Unit codes 0-255 and 47808-49999 match with the official ASHRAE unit-codes from the BACnet Standard. Unit codes in the ranges 256 - 47807 and 50000 - 65535 represent definitions of proprietary units. The "EDE" sheet and the "Unit-Texts" sheet must be maintained in a consistent manner (units referenced in the "EDE" sheet have to be present in "Unit-Texts" sheet).

Format of the "Object-Types" sheet

This sheet contains the object types for BACnet Standard objects and for all proprietary objects being used for interaction between different parties in this project. The first column contains the object-type code, the second column contains the associated text.
Object types supported but not listed in this sheet may be added on the vendor`s discretion.

The "EDE" sheet and the "Object-Types" sheet must be maintained in a consistent manner (for proprietary object-types).

Attention!

Numbers in the "Unit-Texts" and "Object-Types" sheets within the ASHRAE-reserved ranges shall not be changed. These codes are identical to the standard BACnet enumerations and may be used for automatic configuration purposes.

TEXTES D'ÉTAT STANDARD

STATE TEXT REF.NUMBER	BINARY OBJECT INACTIVE	ACTIVE
	1	2
0201	No	Yes
0202	Off	On
0203	Closed	Open
0204	Close	Set
0205	Stop	Open
0206	Starting position	Start
0211	Passive	End pos.
0212	Manual	Active
0221	Reset	Auto
0222	Back	Forward
0231	Down	Up
0232	Bottom	Top
0233	Left	Right
0234	Direct	Reverse
0235	Slow	Fast
0241	Night operation	Day operation
0242	Heating	Cooling
0243	Winter	Sumer
0244	Gas	Oil
0251	Normal	Danger
0252	Normal	Alarm
0253	Normal	Fault
0254	Normal	Maintenance
0255	Normal	Abnormal
0261	Normal	Initialization
0262	Normal	Optimization

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STATE TEXT	MULTIPLE STATE OBJECT									
REF.NUMBER	1	2	3	4	5	6	7	8	9	10
301	Off	Manual	Auto							
302	Closed	Center position	Open							
303	Starting position	Center position	End pos.							
304	Back	Center position	Forward							
311	Bottom	Center position	Top							
321	Left	Center position	Right							
322	Left	Start position	Right							
323	Left	Neutral position	Right							
324	Left	Off	Right							
331	Heating	Zero energy	Cooling							
332	Sustained mode	Setback mode	Heating mode							
341	Normal	Maintenance	Alarm							
351	Slow	Medium	Fast							
361	Off	Stage 1	Stage 2							
401	Off	Stage 1	Stage 2	Stage 3						
411	Emergency Off	Off	On	Frost protection						
501	Off	Stage 1	Stage 2	Stage 3	Stage 4					
511	Off	On	Controller	Min. limit.	Max. limit.					
601	Off	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5				
701	Off	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6			
801	Off	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7		
901	Off	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	Stage 8	
1001	Off	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	Stage 8	Stage 9

Mapping of Engineering Units

Mapping the engineering units used OPC UA is not quite easy. Table 252 shows those units which are identical in both standards and thus can be easily mapped.

Rows marked in yellow, not having an OPC UA UnitId, are handled differently. For those, an EngineeringUnits shall be used having "http://opcfoundation.org/UA/BACnet_V2/" as NamespaceUri, the "BACnetEngineeringUnits enumeration value" as UnitId, the OPC UA DisplayName of the table as DisplayName and the OPC UA Description of the table as Description.

Table 252 – Mapping of BACnet EngineeringUnits to OPC UA UnitIds

BACnetEngineeringUnits enumeration value	OPC UA UnitId	OPC UA DisplayName	OPC UA Description
0	5067851	m²	square metre
1	4609099	ft²	square foot
2	13387	mA	milliampere
3	4279632	A	ampere
4	5195853	Ω	ohm
5	5655636	V	volt
6	4937300	kV	kilovolt
7	4339512	MV	megavolt
8	4469814	V·A	volt - ampere
9	4937281	kV·A	kilovolt - ampere
10	5068353	MV·A	megavolt - ampere
11			volt-amperes-reactive
12	19253	kvar	kilovolt ampere (reactive)
13			megavolt-amperes-reactive
14			degrees-phase
15			power-factor
16	4869973	J	joule
17	4934223	kJ	kilojoule
18	5720146	W·h	watt hour
19	4937544	kW·h	kilowatt hour
20	4862777	Btu	British thermal unit (mean)
21	5125938	thm (US)	therm (U.S.)
22	13399	ton (US) /h	ton (US) per hour
23			joules-per-kilogram-dry-air
24			btus-per-pound-dry-air
25			cycles-per-hour
26			cycles-per-minute
27	4740186	Hz	hertz
28			grams-of-water-per-kilogram-dry-air
29			percent-relative-humidity
30	5066068	mm	millimetre
31	5067858	m	metre
32	4804168	in	inch
33	4607828	ft	foot
34			watts-per-square-foot
35			watts-per-square-meter
36	5002573	lm	lumen
37	5002584	lx	lux
38	5255735	ftc	footcandle
39	4933453	kg	kilogram
40			pounds-mass
41			tons
42	4933459	kg/s	kilogram per second
43	4600625	kg/min	kilogram per minute
44	4536627	kg/h	kilogram per hour

45			pounds-mass-per-minute
46			pounds-mass-per-hour
47	5723220	W	watt
48	4937556	kW	kilowatt
49	5062999	MW	megawatt
50	4863031	Btuth/h	British thermal unit (thermochemical) per hour
51			horsepower
52			tons-refrigeration
53	5259596	Pa	pascal
54	4935745	kPa	kilopascal
55	4342098	bar	bar [unit of pressure]
56	20563	lbf/in²	pound-force per square inch
57			centimeters-of-water
58	4601656	inH2O	inch of water
59			millimeters-of-mercury
60	4864057	cm Hg	centimetre of mercury
61	4601657	inHg	inch of mercury
62	4408652	°C	degree Celsius
63	4932940	K	kelvin
64	4604232	°F	degree Fahrenheit
65			degree-days-Celsius
66			degree-days-Fahrenheit
67			years
68	5066574	mo	month
69	5719365	wk	week
70	4473177	d	day
71	4740434	h	hour
72	5065038	min	minute [unit of time]
73	5457219	s	second [unit of time]
74	5067859	m/s	metre per second
75	4934984	km/h	kilometre per hour
76	18003	ft/s	foot per second
77	18002	ft/min	foot per minute
78	18509	mile/h	mile per hour (statute mile)
79	4609105	ft³	cubic foot
80	5067857	m³	cubic metre
81			imperial-gallons
82	5002322	l	litre
83	4672588	gal (US)	gallon (US)
84	12876	ft³/min	cubic foot per minute
85	5067091	m³/s	cubic metre per second
86	18227	gal (UK) /min	Imperial gallon per minute
87	4666673	l/s	litre per second
88	19506	l/min	litre per minute
89	18226	gal (US) /min	US gallon per minute
90	17476	°	degree [unit of angle]
91	4731186	°C/h	degree Celsius per hour
92	4731187	°C/min	degree Celsius per minute
93	4862515	°F/h	degree Fahrenheit per hour
94	4862516	°F/min	degree Fahrenheit per minute
95			no-units
96			parts-per-million
97			parts-per-billion
98	20529	%	percent
99			percent-per-second
100			per-minute
101			per-second
102			psi-per-degree-Fahrenheit
103			radians
104	5394509	r/min	revolutions per minute
105			currency1
106			currency2
107			currency3
108			currency4
109			currency5
110			currency6

111			currency7
112			currency8
113			currency9
114			currency10
115	4804171	in²	square inch
116	4410699	cm²	square centimetre
117	16730	BtuIT/lb	British thermal unit (international table) per pound
118	4410708	cm	centimetre
119			pounds-mass-per-second
120			delta-degrees-Fahrenheit
121			delta-degrees-Kelvin
122	4338745	kΩ	kiloohm
123	4339509	MΩ	megaohm
124	12890	mV	millivolt
125	4338738	kJ/kg	kilojoule per kilogram
126	13122	MJ	megajoule
127			joules-per-degree-Kelvin
128			joules-per-kilogram-degree-Kelvin
129	5064794	kHz	kilohertz
130	4933722	MHz	megahertz
131			per-hour
132	4404017	mW	milliwatt
133	4274487	hPa	hectopascal
134	5063250	mbar	millibar
135	5067080	m³/h	cubic metre per hour
136			liters-per-hour
137			kilowatt-hours-per-square-meter
138			kilowatt-hours-per-square-foot
139			megajoules-per-square-meter
140			megajoules-per-square-foot
141			watts-per-square-meter-degree-kelvin
142			cubic-feet-per-second
143			percent-obscuration-per-foot
144			percent-obscuration-per-meter
145	4535349	mΩ	milliohm
146	5068616	MW·h	megawatt hour (1000 kW.h)
147			kilo-btus
148			mega-btus
149			kilojoules-per-kilogram-dry-air
150			megajoules-per-kilogram-dry-air
151			kilojoules-per-degree-Kelvin
152			megajoules-per-degree-Kelvin
153	5129559	N	newton
154	4600377	g/s	gram per second
155	4600376	g/min	gram per minute
156	4534584	t/h	tonne per hour
157			kilo-btus-per-hour
158			hundredths-seconds
159	4403766	ms	millisecond
160	20053	N·m	newton metre
161	4403510	mm/s	millimetre per second
162	4732977	mm/min	millimetre per minute
163	12888	m/min	metre per minute
164	5060144	m/h	metre per hour
165	4666675	m³/min	cubic metre per minute
166	5067595	m/s²	metre per second squared
167	16709	A/m	ampere per metre
168	4273201	A/m²	ampere per square metre
169	16693	A·m²	ampere square metre
170	4604242	F	farad
171	14385	H	henry
172	4404785	Ω·m	ohm metre
173	5458245	S	siemens
174	4469040	S/m	siemens per metre
175	4469555	T	tesla
176	4469816	V/K	volt per kelvin

177	4470064	V/m	volt per metre
178	5719362	Wb	weber
179	4408396	cd	candela
180	4272692	cd/m²	candela per square metre
181	4600112	K/h	kelvin per hour
182	4600113	K/min	kelvin per minute
183	4337976	J·s	joule second
184	12865	rad/s	radian per second
185	4732217	m²/N	square metre per newton
186	4934993	kg/m³	kilogram per cubic metre
187	4404535	N·s	newton second
188	13392	N/m	newton per metre
189	4470067	W/(m·K)	watt per metre kelvin
190	4340025	µS	microsiemens
191	12875	ft³/h	cubic foot per hour
192			us-gallons-per-hour
193	4934996	km	kilometre
194	13384	µm	micrometre (micron)
195	4674125	g	gram
196	5064525	mg	milligram
197	5065812	ml	millilitre
198	13360	ml/s	millilitre per second
199	12878	dB	decibel
200			decibels-millivolt
201			decibels-volt
202	4403767	mS	millisiemens
203			watt-hours-reactive
204			kilowatt-hours-reactive
205			megawatt-hours-reactive
206			millimeters-of-water
207			per-mille
208			grams-per-gram
209	5059129	kg/kg	kilogram per kilogram
210			grams-per-kilogram
211	4732468	mg/g	milligram per gram
212	20033	mg/kg	milligram per kilogram
213	18250	g/ml	gram per millilitre
214	18252	g/l	gram per litre
215	19761	mg/l	milligram per litre
216	4731449	µg/l	microgram per litre
217	4274483	g/m³	gram per cubic metre
218	18256	mg/m³	milligram per cubic metre
219	18257	µg/m³	microgram per cubic metre
220			nanograms-per-cubic-meter
221	12851	g/cm³	gram per cubic centimetre
222	4346188	Bq	becquerel
223	12881	kBq	kilobecquerel
224	13390	MBq	megabecquerel
225	4274485	Gy	gray
226	4403507	mGy	milligray
227			microgray
228	4469043	Sv	sievert
229	4403768	mSv	millisievert
230			microsieverts
231	5257010	µSv/h	microsievert per hour
232			decibels-a
233			nephelometric-turbidity-unit
234	5321520	pH	pH (potential of Hydrogen)
235	18253	g/m²	gram per square metre
236			minutes-per-degree-kelvin