

RPP-S sigfox message format

*If you have Sigfox account you can add new sigfox device over web <https://backend.sigfox.com>

*Every sigfox device is added with unique ID and PAC code in sigfox network. These codes you will get from producer of sigfox device.

*At every added sigfox device in your account you can fill „CALLBACK“ (address of your application server where will be forwarded data from your sigfox device)

*Typical CALLBACK can look for example like this:

<https://host/path?device={device}&data={data}&fseqNumber={seqNumber}>

where *host/path?* is parameters of your application server

where *{device}* is ID code of sigfox device sent by sigfox server

where *{seqNumber}* is number of message from sigfox device sent by sigfox server

where *{data}* is always 12 bytes message data (values) from sigfox device sent by sigfox server

* For RPP-S content of 12 bytes message is below on next page.

* RPP-S sends 5 types of 12 bytes messages during operation

Value - Regular message with measured data (RVA - radon concentration (RaA+RaC), temperature, relative humidity, accumulator voltage (battery), status of high voltage). Time interval is adjustable (default 1 hour). Values and interval of sending Value messages are same as values and interval of saved data into internal memory of probe. The interval of sending Value messages is set by interval of saving data into internal memory of probe „Concentration Record“ in usbRADONview application.

Start – Extra message is sent immediately only when probe is switched on

Keepalive1 – Extra message is sent regularly every midnight with information about configuration and status of probe.

Keepalive2 - Extra message is sent regularly every midnight with information about configuration and status of probe.

GPS - Extra message is sent regularly every midnight with information about GPS position of probe. If probe „see“ less than 2 GPS satellites the message is not sent.

Bytes	Hexa symbol number	KeepAlive1	KeepAlive2	Value	START	GPS																																																																																					
byte 1	1	Device (04)	Device (04)	Device (04)	Device ID (04)	Device ID (04)																																																																																					
	2						byte 2	3	Message (01)	Message (11)	Message (02)	Message (99)	Message (15)	4	byte 3	5	Voltage [mV]	Voltage [mV]	Voltage [mV]	Voltage [mV] here: Voltage = 0	GPS N3	6	GPS N2	byte 4	7	8	byte 5	9	HW number	Discrimination 1	RVA [Bq/m3]	HW number	GPS N1	10	Discrimination 2	GPS N0	byte 6	11	12	byte 7	13	SW number	Discrimination 3	SW number	SW number	GPS E3	14	byte 8	15	Periode [min]	Calibr. C. A	Temperature [°C]	Periode [min]	GPS E2	16	byte 9	17	Channel max [-]	Calibr. C. AC	Humidity [%]	Channel max [-]	GPS E1	18	byte 10	19	Pulses in max [-]	Calibr. C. AC	HV [-]	Pulses in max [-]	GPS E0	20	byte 11	21	Channel max d2[-]	Gain	Total count (x 1000)	Channel max d2[-]	Altitude [x 0,1m]	22	byte 12	23	Channel max d3[-]	Gain	Total count (x 1000)	Channel max d3[-]	Altitude [x 0,1m]	24				
byte 2	3	Message (01)	Message (11)	Message (02)	Message (99)	Message (15)																																																																																					
	4						byte 3	5	Voltage [mV]	Voltage [mV]	Voltage [mV]	Voltage [mV] here: Voltage = 0	GPS N3	6	GPS N2	byte 4					7	8	byte 5	9	HW number	Discrimination 1	RVA [Bq/m3]	HW number		GPS N1			10	Discrimination 2	GPS N0	byte 6	11	12	byte 7	13	SW number	Discrimination 3	SW number			SW number	GPS E3	14	byte 8	15		Periode [min]	Calibr. C. A	Temperature [°C]	Periode [min]	GPS E2	16	byte 9		17	Channel max [-]	Calibr. C. AC	Humidity [%]	Channel max [-]	GPS E1	18		byte 10	19	Pulses in max [-]	Calibr. C. AC	HV [-]	Pulses in max [-]	GPS E0			20		byte 11	21	Channel max d2[-]	Gain			Total count (x 1000)		Channel max d2[-]	Altitude [x 0,1m]	22	byte 12	23
byte 3	5	Voltage [mV]	Voltage [mV]	Voltage [mV]	Voltage [mV] here: Voltage = 0	GPS N3																																																																																					
	6					GPS N2																																																																																					
byte 4	7																																																																																										
	8																																																																																										
byte 5	9	HW number	Discrimination 1	RVA [Bq/m3]	HW number	GPS N1																																																																																					
	10		Discrimination 2			GPS N0																																																																																					
byte 6	11																																																																																										
	12																																																																																										
byte 7	13	SW number	Discrimination 3	SW number	SW number	GPS E3																																																																																					
	14																																																																																										
byte 8	15	Periode [min]	Calibr. C. A			Temperature [°C]	Periode [min]	GPS E2																																																																																			
	16																																																																																										
byte 9	17	Channel max [-]		Calibr. C. AC	Humidity [%]	Channel max [-]	GPS E1																																																																																				
	18																																																																																										
byte 10	19	Pulses in max [-]	Calibr. C. AC		HV [-]	Pulses in max [-]	GPS E0																																																																																				
	20																																																																																										
byte 11	21	Channel max d2[-]		Gain	Total count (x 1000)	Channel max d2[-]	Altitude [x 0,1m]																																																																																				
	22																																																																																										
byte 12	23	Channel max d3[-]	Gain			Total count (x 1000)		Channel max d3[-]	Altitude [x 0,1m]																																																																																		
	24																																																																																										

Device – Type of sensor. Radon sensor has always code 0x04h (warning it is hexadecimal value)

Message – Type of message from probe. Keepalive1=0x01h; Keepalive2=0x11h; Value=0x02h; Start=0x99h; GPS=0x15h (warning it are hexadecimal values)

Voltage [mV] – Current voltage of probe internal accumulator in milivolt.(higher byte left;decimal)

RVA [Bq/m3] –Last record of RVA in probe. Counted from Po-218(RaA)+ Po-214(RaC). .(higher byte left; decimal)

Temperature [°C] – Last record of temperature in probe. Coding below:

Coding signed char - range from -128 to +127 °C

dec	hex	°C
0	0x00	0
1	0x01	+1
.		
127	0x7F	+127
128	0x80	-128
129	0x81	-127
.		
254	0xFE	-2
255	0xFF	-1

Humidity [%] - Last record of relative humidity in probe.(decimal)

HV [-] – Status of high voltage in measuring chamber (frequency of charging). Number should not raise over 40 (service information).

Total count [x 1000] – Number of impulses catch by detector from beginning (service information).

HW number [-] – Serial number of probe. (decimal)

SW number [-] – Version of probe software.(two hex symbols)

Periode [min] – Time interval of measured data saving to internal memory and time interval of measured data sending to Sigfox. (decimal)

Channel max [-] – Description of last energy spectrum - Channel (Energy) in maximum of whole spectrum [x 0,1 MeV]. Expected energy peak for Po-218 is in 60-61 channel as 6,00MeV. Expected energy peak for Po-214 is in 77-78 channel as 7,69MeV. (expert information). (decimal)

Pulses in max [-] – Description of last energy spectrum – Number of caught impulses with energy in Channel max.

Channel max d2 [-] - Description of last energy spectrum – Channel (Energy) in maximum of spectrum area Po-218 [x 0,1 MeV] (expert information). (decimal)

Channel max d3 [-] - Description of last energy spectrum – Channel (Energy) in maximum of spectrum area Po-214 [x 0,1 MeV] (expert information). (decimal)

Discrimination 1 [-] – Discriminating energy channel for beginning of area d2 (Po-218)(expert information). (decimal)

Discrimination 2 [-] - Discriminating energy channel for dividing line between area d2 (Po-218) and area d3 (Po-214)(expert information). (decimal)

Discrimination 3 [-] - Discriminating energy channel for ending of area d3 (Po-214)(expert information). (decimal)

Calibr. C.. A [-] – Calibration constant for radon concentration from Po-218(RaA)(service information). (decimal)

Calibr. C. AC [-] - Calibration constant for radon concentration from Po-218(RaA)+ Po-214(RaC)(service information). (decimal)

Gain [-] – Offset of energy spectrum (service information).(decimal)

Coding of probe GPS position

* If probe „see“ less than 2 GPS satellites the message „GPS“ isnt sent.

Altitude [x 0,1m] - Altitude of probe location in decimeter. (decimal)

	GPS N3	GPS N2	GPS N1	GPS N0
Latitude = 0..90° >>	ssssNaaa	aaaaaaaa	aaaaaaaa	aaaaaaaa

s - number of visible satellites during last position measuring; max 12,(decimal)

a – latitude 27bits; decadic number always with 6 decimal position (highest byte left)

N – north; N= 1 >> North „N“; N = 0 >> South „S“

	GPS E3	GPS E2	GPS E1	GPS E0
Longitude = 0.. 180° >>	xkkEbbbb	bbbbbbbbb	bbbbbbbbb	bbbbbbbbb

x – reserve, not use

k – communication; k= 0 >> signal OK, k = 1 >> OK differential GPS (only for service)

b – longitude 28bits;decadic number always with 6 decimal position (highest byte left)

E – east; E= 1 >> East „E“; E = 0 >> West „W“

Example:

Received 12 bytes sigfox message in hexadecimel format: 04153afbe12c30da63ec0416

0x0415 – radonsensor; GPS message

0x0416 – altitude 104,6m

0x3afbe12c – latitude (s = 3 satellites; N=1 (North „N“); a = 50.061612)

0x30da63ec – longitude (k=1; E=1 (East “E”); b = 14.312428)

50.061612N; 14.312428E

>>GPS format WGS-84: 50° 06,1612 N; 14° 31,2428 E

>> GPS format integer: 50 +6,1612/60 N ; 14 + 31,2428/60 E >> 50.1026867N; 14.5207133E