

Description of serial communication RS485 - MODBUS for radon probe TESLA®TSRS2 (v.3)

Setting device address „ADDRESS“

Address of slave device is possible to set in range 1-247 by switches “ADDRESS”. After changing of address is necessary to make a restart of device. LSB (least significant bit) of address is switch with label „1“. Logical level „0“ is represented by switch in down position.

Setting of parameters of communication „RATE“

Communication parameters is possible to set by switches „RATE“ according chart below:

RATE 4 3 2 1	speed (kbaud)	parity	stop-bit
0 0 0 0	19,2	EVEN	1
0 0 0 1	9,6	EVEN	1
0 0 1 0	2,4	EVEN	1
0 0 1 1	1,2	EVEN	1
0 1 0 0	19,2	ODD	1
0 1 0 1	9,6	ODD	1
0 1 1 0	2,4	ODD	1
0 1 1 1	1,2	ODD	1
1 0 0 0	19,2	NONE	2
1 0 0 1	9,6	NONE	2
1 0 1 0	2,4	NONE	2
1 0 1 1	1,2	NONE	2
1 1 0 0			
1 1 0 1	Don't use		
1 1 1 0			
1 1 1 1			

Registers map

Every register has 2 bytes of binary data (WORD). Maximum number of registers for reading at once is 60 registers (120 bytes). Blue highlight registers are most interesting for quick SW implementation of device.

(L)... means Lower 2 bytes in 4 bytes value;

(H)... means Higher 2 bytes in 4 bytes value;

(INT)... means INTEGER data type of binary value;

(UINT)... means UNSIGNED INTEGER data type of binary value

Registers of current values (command 0x03) – only reading

Add ress of reg	Value	Description
1	concentrationTime	Actual running time in interval 240s (4 min.) in seconds. New value of Rn concentration is available every 4 min! (UINT)
2	concentration (L)	Actual value of Rn concentration in Bq/m ³ . Values is moving average per last 1 hour. New value of Rn concentration is available every 4 min! (UINT)
3	concentration (H)	
4	temperature	Actual temperature in °C (INT) in chamber.
5	humidity	Actual humidity in % (UINT) in chamber.
6	reserve	
7	reserve	
8	sum1(L)	Actual number of Alpha particles with energy power below level d1 (for service use) (UINT)
9	sum1(H)	
10	sum2(L)	Actual number of Alpha particles with energy power between level d1 and level d2 (for service use) (UINT)
11	sum2(H)	
12	sum3(L)	Actual number of Alpha particles with energy power between level d2 and level d3 (for service use) (UINT)
13	sum3(H)	
14	sum4(L)	Actual number of Alpha particles with energy power above d3 (for service use) (UINT)
15	sum4(H)	
16	impulsesHV	Actual number of voltage impulses for create high voltage – status of high voltage generator (for service use) (UINT)
17	concentrationDay(L)	Actual value of long-term Rn concentration in Bq/m ³ . Values is moving average per last 1 day. (UINT)
18	concentrationDay(H)	
19	recordTime	Actual running time in setting interval of record saving in seconds. Records are saved into radon probe memory. (UINT)
20	recordCount	Actual number of saved records. max 4096 (UINT)
21	spectrumTime	Actual running time in setting interval of energy spectrum saving in seconds. Energy spectrum are saved into radon probe memory. (UINT)
22	spectrumCount	Actual number of record just measured energy spectrum (UINT)
23	impulsesTotal(L)	Actual total number of Alpha particles for life (for service use) (UINT)
24	impulsesTotal(H)	

Setting registers – reading and writing (commands 0x03 and 0x10)

Red highlight registers are very important for correct measurement of probe. It is recommended not to change this registers.

Address of reg	Value	Description
25	reserve	
26	reserve	
27	reserve	
28	discrimination1(d1)	The whole energy spectrum is divided into three adjustable discriminatory layers divides the whole area into four parts. Value of layer 1. It is determined individually during probe calibration. (UINT)
29	discrimination2(d2)	The whole energy spectrum is divided into three adjustable discriminatory layers divides the whole area into four parts. Value of layer 2. It is determined individually during probe calibration. (UINT)
30	discrimination3(d3)	The whole energy spectrum is divided into three adjustable discriminatory layers divides the whole area into four parts. Value of layer 3. It is determined individually during probe calibration. (UINT)
31	calibrationA	The constant value for the calculation of the concentration of radon from RnA. It is determined individually during probe calibration. (UINT)
32	calibrationAC	The constant value for the calculation of the concentration of radon from RnA + RnC. It is determined individually during probe calibration. (UINT)
33	limit	Limit of radon concentration for generate alarm at some kind of systems (UINT)
34	gain	Value of movement of the energy spectrum to left or right. It is determined individually during probe calibration. (UINT)
35	offset	Offset value for correct setup of analog path. It is determined individually during probe calibration. (UINT)
36	dataRecord	Regular time interval for saving record of data (concentration) in minutes (default is 60 (1 hour)) (UINT)
37	spectrumRecord	Regular time interval for saving energy spectra in minutes (default is 720 (12 hours)) (UINT)
38	algorithm	Type of concentration calculation. 0 – calculation from RnA; 1..255 – calculation from RnA + RnC (UINT)
39	realTime(L)	Actual number of seconds since start of year 2000. (UINT)
40	reslTime(H)	
41-50	customerText	Customer text string 20x ASCII
51-59	reserve	

Identification (command 0x03) – only reading

Address of reg	Value	Description
60-64	device	Type of device 10x ASCII
65-69	versionSW	SW version 10x ASCII
70-74	serialNumber	Serial number 10x ASCII

Commands formats

Reading

command 0x03 - Read Holding Registers

dev.address	command	addr 1. reg of read	num of reading reg	Crc
0x02	0x03	0x0004	0x0001	

Writing

command 0x10 - Write Multiple Registers

dev.address	command	addr 1. reg of write	num of writing reg	num of bytes	Crc
0x02	0x10	0x0004	0x0001	0x02	