

RADIO RECEIVERS R11 AND R11U (v130302)

Radio receivers R11, R11U

Radio receivers are applied as a component part of the radio protection system RAS-3 and are designed for reception and decoding of encoded messages sent via radio communication channel at VHF (R11) or UHF (R11U) frequency band.

Signals sent via the encoding system RAS-3 are received and decoded by the receivers.



Operation and key features

Receiver R11 (R11U) is a double-conversion superheterodyne with digital identification of signal received. Received and identified signal is processed and transmitted to the output.

Processing of received signals is performed by a microcontroller. It identifies a signal sent and thereby generates a message of set form and structure. The message is filtered and transmitted by set attributes via serial port to monitoring software or to other compatible transmission modules. Receiver contains filters allowing message filtering based on:

- subsystems of encoding system;
- communication route;
- sequence of subscription numbers;
- recurrence time of the same messages;

The receiver measures the level of receiving signal, records the communication route and shows all the above at the output signal.

The receiver generates and transmits service messages to the outputs. The service messages may be displayed in the monitoring software or transmitted via communication channel.

The receiver includes the serial port RS232 through which the information received via port can be transmitted by radio channel.

Specifications

1. The radio receiver R11 operates at VHF range from 146 to 174 MHz.
2. The radio receiver R11U operates at UHF range from 430 to 470 MHz.
3. Radio-technical parameters of the receiver conform to the requirements provided in the Standard EN 300 113.
4. Sensitivity of the receivers R11, R11U is not less than 1 μ V, at adequately received message number 80%. Other radio-technical parameters are specified in Table No. 1.
5. The receiver measures the strength of signal received and attributes it to a certain level. Level and signal conformity is specified in Table No. 2.

6. Received messages are transmitted via the serial port RS232 to the monitoring software or via MCI bus to the compatible transmission devices. Output messages indicated in Attachment A are sent to the monitoring software. Unsent message buffer capacity up to 300 last messages. Data exchange parameters are specified during setting of operation parameters of the receiver.
7. Receiver has two inputs designated for independent message sending. Type of inputs NC/NO/EOL=2,2 kΩ.
8. The receivers R11, R11U are powered with 12,6 V DC. Allowable voltage variation limits are from 11 to 15 V. Applied current shall not exceed 150 mA.
9. Receivers operate at ambient air temperature from -10°C to +55°C, and relative air humidity up to 90% at +20°C.
10. Overall dimensions of the receiving module do not exceed 200 x 110 x 38 mm.
11. Receiver weight up to 0,2 kg.

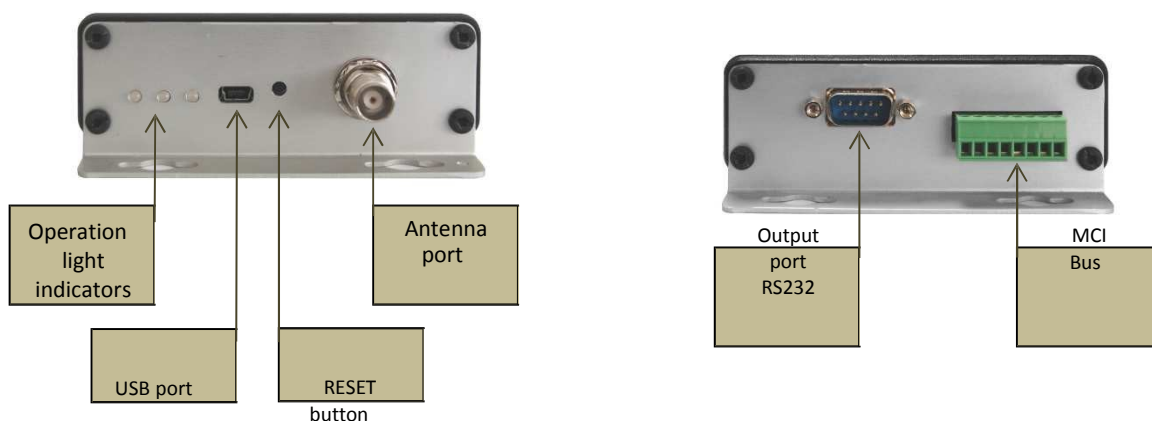
Parameter	Value
Modulation	narrow-band frequency
Deviation not more than	±3 kHz
Receiver input resistance	50 Ω
Communication channel separation	12,5 kHz
Operation frequency setting error not more than	±200 Hz
Adjacent channel selectivity not less than	60 dB
Image channel selectivity not less than	70 dB
Data transmission rate at radio channel	2,4 kb/s

Table 2.

Level	Input voltage μV	Signal strength, dBm	Level	Input voltage μV	Signal strength, dBm
0	1	-107	8	40	-75
1	1,585	-103	9	63	-71
2	2,5	-99	A	100	-67
3	4	-95	B	158	-63
4	6,3	-91	C	250	-59
5	10	-87	D	400	-55
6	16,85	-83	E	630	-51
7	25	-79	F	1000	-47

Note:
These levels differ from the table of levels in RAS-2M system!

General view and connection layout



* Designation of MCI bus contact terminals is indicated in Table No. 3

Table 3.

Terminal	Purpose
PGM2	Predefined for further use
PGM1	Predefined for further use
IN2	2nd input (AC fail)
IN1	1st input (tamper)
GND	General conductor
MCI	MCI bus
GND	General conductor for power supply connection
+E	For supply voltage +12,6 V connection

Light indication

Receiver operation is shown by light indication. Operation of light indicators is specified in Table No. 4.



Table 4.

Indicator	Operation	Description
„Network“	Blinking green	Message receiving via radio channel
	Lighting yellow	Background level of communication channel is
“Data”	Lighting green	Unsent messages are still present
	Lighting green and red simultaneously	Output buffer is overfilled
„Power“	Blinking green	Supply voltage is sufficient
	Blinking yellow	Supply voltage is low (below 11,5 V)
	Blinking green and red successively	The only USB port is connected for programming

Preparing receiver for operation

Sequence of preparation:

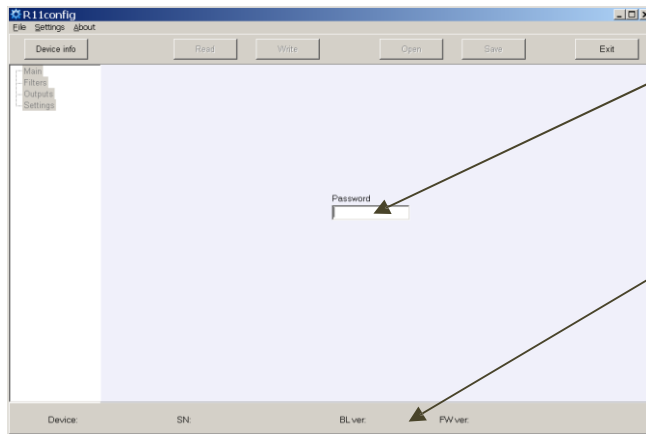
1. Set the required device operating parameters. Radio receivers with settings adjusted under the requirements agreed in a procurement order are provided to the users;
2. Install the receiver in the designated location;
3. Connect the antenna;
4. Connect power supply and peripherals (monitoring software or transmission modules);
5. Check the receiver for operation.

Setting of operating parameters

Setting of operating parameters is executed by the parameter setting software R11config v130226, having connected the computer and receiver by USB cable. Usage of software and change of settings is available both at external power supply activated and at powering via USB port.



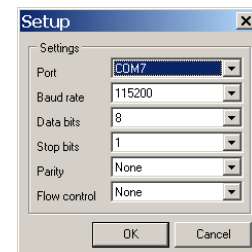
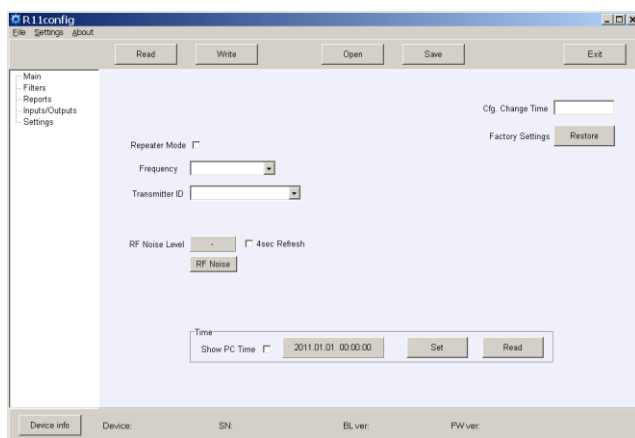
Run the software R11config and the window will open where:



1. Enter Admin password 1234 using the computer keyboard and click [Enter]

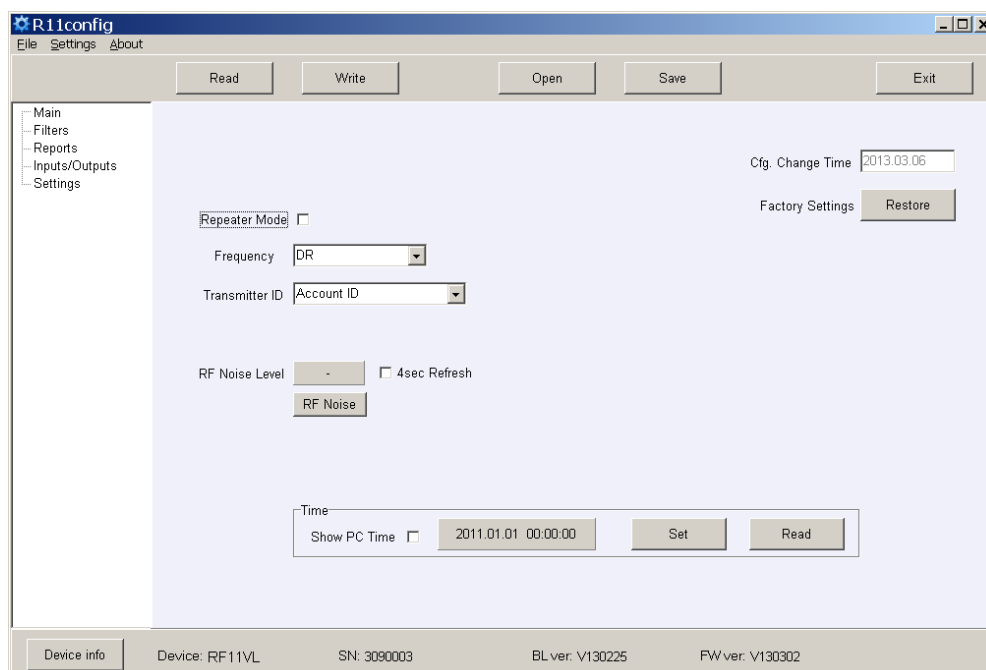
At the bottom of the window are displayed:
equipment type Device,
serial number SN, boot
loader version BL ver.
firmware version FW ver.

If password is unknown, information about receiver's type and software / firmware versions will be displayed after clicking [Device info].



USB port settings in the column Settings

2. Scan the receiver parameters by clicking [Read].
3. Set (Repeater mode), (Frequency) and (Transmitter ID) in the program branch **Main**. Having selected Account ID, messages will be allocated by transmitter object number, having selected Transmitter SN – transmitter serial number, having selected Transmitter SN+ Account ID – by both numbers.



4. Set the required filter parameters in the program branch **Filters**

Time filter
Deaf time, s: 10

RF code
☒ RAS-3

Subsystem

<input checked="" type="checkbox"/> 0	<input checked="" type="checkbox"/> 4	<input checked="" type="checkbox"/> 8	<input checked="" type="checkbox"/> 12
<input checked="" type="checkbox"/> 1	<input checked="" type="checkbox"/> 5	<input checked="" type="checkbox"/> 9	<input checked="" type="checkbox"/> 13
<input checked="" type="checkbox"/> 2	<input checked="" type="checkbox"/> 6	<input checked="" type="checkbox"/> 10	<input checked="" type="checkbox"/> 14
<input checked="" type="checkbox"/> 3	<input checked="" type="checkbox"/> 7	<input checked="" type="checkbox"/> 11	<input checked="" type="checkbox"/> 15

Account ID filter

	From:	To:
1	0000	FFFF
2	FFFF	0000
3	FFFF	0000
4	FFFF	0000
5	FFFF	0000
6	FFFF	0000
7	FFFF	0000
8	FFFF	0000

Repeater filter

	From:	To:
1	09	00
2	FF	00
3	FF	00
4	FF	00
5	FF	00
6	FF	00
7	FF	00
8	FF	00

Device info: Device: RF11VL SN: 3090003 BL ver: V130225 FW ver: V130302

Time filter – tolerance time for the same message;

RF code – tick the checkbox of message reception of the coding system RAS-3;

Subsystem – tick the checkbox of required subsystem reception;

Account ID filter – sequences of receiving object numbers;

Repeater filter – sequences of required repeater numbers;

5. Set the parameters of output to the monitoring software or transmission modules in the program branch **Reports**.

a) When messages transmitted to the monitoring software Monas MS

Output Protocol: MONAS-3 HB time: 30 s

Receiver Number: 9 RF Noise Max: 3 Event TO: 5 min

Line Number: 9

Events

Event Name	Active	Event Code
Heart Beat	Yes	TDFO0101_*
Acknowledge	Yes	TDFO
Power On	No	TD100101* ***** **00001234_R30899000_*****
Low Battery	Yes	TD100101* ***** **00001234_E30299000_*****
Low Battery Restore	Yes	TD100101* ***** **00001234_R30299000_*****
High RF Noise	Yes	TD100101* ***** **00001234_E34499000_*****
RF Noise Restore	Yes	TD100101* ***** **00001234_R34499000_*****

RS232

☐ Off ☒ Out ☐ In Baud Rate: 9600

MCI

Active: ☐ Self Address: 0

Device	Type	Address	Tx TO	No Dupl.
1	Transmitter 1	1	15	Off
2	None	0	0	Off

Baud Rate: 9600

Device info: Device: RF11VL SN: 3090003 BL ver: V130225 FW ver: V130302

Set the Out Protocol, Receiver Number and Line number, HB time and Baud Rate for RS232.

- b) Set those service messages which will be sent. Tick them in the checkbox Active. Enter the required subscription number of the receiver number and event codes. The recommended event codes are specified in Attachment B.

The R11config dialog box shows the 'Event' field with the text 'TD100101*_*_*_*_*_*_*_*_*_*0001234_E30299000_*_*_*_*_*_*_*_*_*_*'. The 'Active' checkbox is checked. There are 'OK' and 'Cancel' buttons.

- c) When messages transmitted to the transmission modules (Repeater Mode)

The R11config main window shows the 'Settings' tab. The 'Output Protocol' is set to 'MONAS-3D'. The 'Receiver Number' is '9' and the 'Line Number' is '9'. The 'HB time' is '30' s. The 'RF Noise Max' is '3' and the 'Event TO' is '5' min. The 'Events' table is as follows:

Event Name	Active	Event Code
Heart Beat	Yes	54448F000E01010000*
Acknowledge	Yes	54449F000B****
Power On	No	1401FFFF12345601001234*****0330899000
Low Battery	Yes	1401FFFF12345601001234*****0130299000
Low Battery Restore	Yes	1401FFFF12345601001234*****0330299000
High RF Noise	Yes	1401FFFF12345601001234*****0134499000
RF Noise Restore	Yes	1401FFFF12345601001234*****0330299000

The 'RS232' section has 'Off' selected for the direction and '9600' for the Baud Rate. The 'MCI' section has 'Active' checked, 'Self Address' set to '0', and a table for transmission modules:

Device	Type	Address	Tx TO	No Dupl.
1	Transmitter 1	1	15	Off
2	None	0	0	Off

The Baud Rate for MCI is set to '9600'. The status bar shows 'Device: RF11VL', 'SN: 3090003', 'BL ver: V130225', and 'FW ver: V130302'.

Set the Out Protocol, Receiver Number and Line Number, tick the checkbox Active for MCI bus enabling, and set Baud Rate. Specify the Self Address the numerical value of which should be lower than the value of connecting transmission modules.

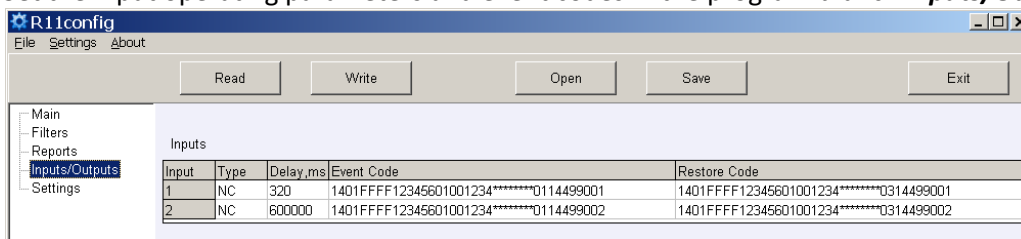
- d) Specify the sequence of transmission modules, addresses, answer waiting time Ack TO, sending delay (if any) Tx TO and ignoring of re-transmitted messages No Dupl.

The R11 MCI dialog box shows the configuration for a transmission module. The 'Type' is 'Transmitter 1', the 'Address' is '1', the 'Tx TO' is '15', and 'No Dupl.' is 'Off'. There are 'OK' and 'Cancel' buttons.

Sending delay Tx TO is applied for sent signal delaying in the radio system. Numerical value repeatable 250 ms.

Ignoring of re-transmitted messages No Dupl. is to be turned on when several radio repeaters are operating in the system and it is necessary to reduce the number of messages sent via channel (solution of radio channel occupancy problem).

6. Set the input operating parameters and event codes in the program branch **Inputs/Outputs**

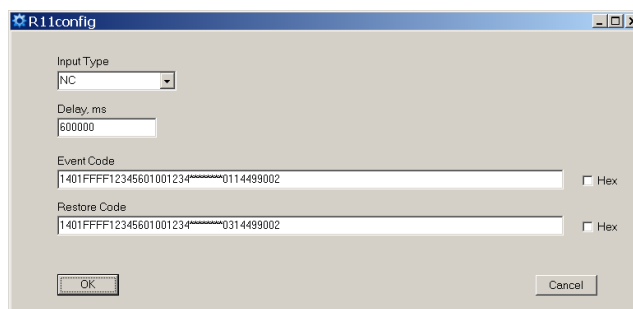


Input Type – specify the input type;

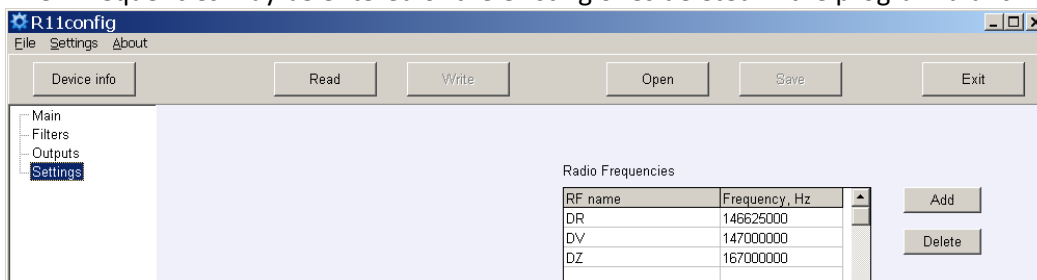
Delay – specify the input response time;

Event Code – event code and sending object number after input actuation;

Restore Code – event code and sending object number after input restoration;



7. New frequencies may be entered or the existing ones deleted in the program branch **Settings**.



Receiver settings, having their storage location indicated in the computer memory, may be stored by clicking the button [Save], and later on they can be used for parameter setup of other receivers. Stored settings may be prompted by clicking [Open] and indicating data storage location.

Click [Exit] to exit from the parameter setting software.

ATTACHMENT A

Receiver output signal in the serial port RS232

- a) when the following Monas3 output protocol is set

TD1001017_***010532_3D025218_E13002027_120514/153241

where:

TD – symbol of start

10 - message type/subtype (Contact ID)

01 – receiver number 01

01 – line number 01

7 – signal level 7

** – repeater number (direct reception)

* – level in repeater (none)

010532– transmitter No. 010532

3D – message No. (from object No. 010532) 61 (3D hex)

025218 – subsystem 02 / Account ID 5218

E13002027 – Contact ID data

12 – year 12

05 – month 05

14 – day 14

15 – hour 15

32 – minute 32

41 – second 41

- b) When the following Surgard MLR2-DG output protocol is set

5011 181234E14401002

where:

5 – message type

01 – receiver number

1 – line number

18 – protocol type

1234 – object number

E – CID classifier

144 – CID event code

01 – CID subgroup number

002 – CID event location

ATTACHMENT B

Receiver R11

Recommended event codes of service messages

R11 event code

1401FFFF12345601001234*****0330199000

where:

1234 object number 8191
 03 event/restore
 301 event code
 99 subgroup
 000 location

Event	RAS-3D change into	ECID	Note
Power ON	0330199000	R301 99 000	do not send
Low Battery	0130299000	E302 99 000	send
Low Battery Restore	0330299000	R302 99 000	send
Hight RF Noise	0135599000	E355 99 000	send
RF Noise Restore	0335599000	R355 99 000	send
Cfg. Change	0362899000	R628 99 000	send
Time fault	0170099000	E700 99 000	do not send
Time Set	0370099000	R700 99 000	do not send
MCI Error	0171299000	E712 99 000	do not send
MCI Restore	0371299000	R712 99 000	do not send
RS232 Error	0171399000	E713 99 000	do not send
RS232 Restore	0371399000	R713 99 000	do not send
CRC Error	0130799000	E307 99 000	do not send
Transmitter PING		E770 99 00X	where: x – next PING period do not send