

User manual

30.05.07
V1.0

RTR970

Radio data receiver



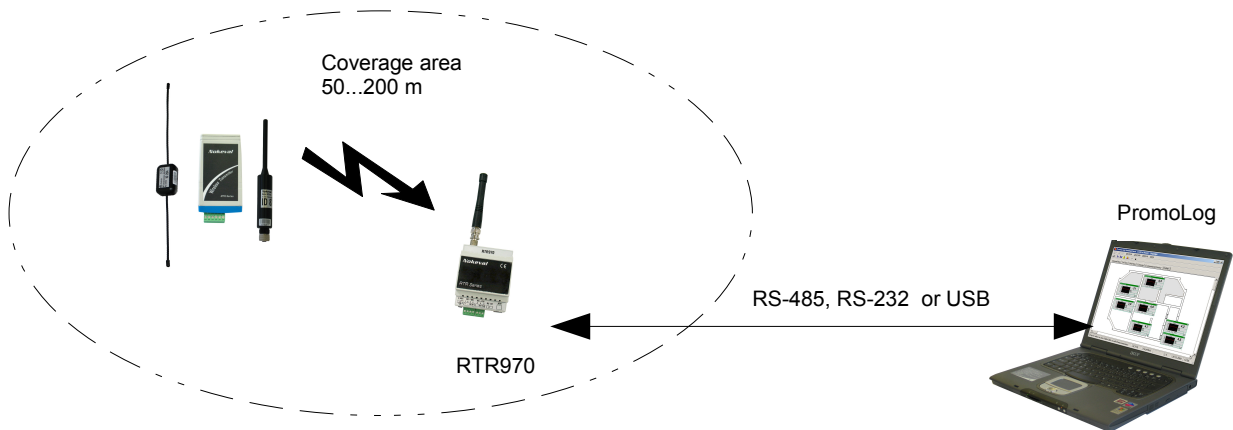
Nokeval

DESCRIPTION

RTR970 is radio data receiver for Nokeval MTR series wireless transmitters. It receives and buffers the data packets that MTR transmitters have sent. It automatically recognizes the types of the transmitters, so different kinds of transmitters can be used simultaneously. Transmitters can also have different transmission intervals. RTR970 uses license free 433.92 MHz frequency band (ISM) so it can be freely used, for example, almost in whole Europe.

RTR970 is 35 mm DIN rail mountable but desktop use is also possible. The receiver is connected to a computer using RS-485, USB or RS-232 bus and it requires PromoLog application that reads the information from the device.

Nokeval SCL protocol is used for data transmission between the receiver and the computer. Multiple receivers can be connected in parallel to an RS-485 bus to increase the coverage area. The receiver has three indicator LEDs and it requires 9..30 VDC.



SPECIFICATIONS

Radio receiver

Antenna

Connector: 50 Ω BNC female contact
Standard antenna: helical whip antenna (BNC connector)
Max input power: +10 dBm

Radio

Frequency band license free 433.92MHz subband e according to ERC/REC 70-03
Bandwidth: 180 kHz
Modulation: ASK
Selective filter: Yes, SAW type
Sensitivity: -100 dBm ($3 \cdot 10^{-3}$ error ratio)

Decoder:

Receive rate: 5 kbps
Buffer memory: 96 latest transmissions

Serial connections

RS-485

Connector: Detachable screw post connector with 3.81 mm raster, combined with power supply, terminal 3 D1, terminal 4 D0. Maximum cable length is 1000 m.
Protocol: Nokeval SCL
Baud Rates: 300/600/1200/2400/4800/9600/19200
Address: 0...123

RS-232

Connector: Detachable screw post connector with 3.81 mm raster, terminal 6 TxD, terminal 7 RxD. Maximum cable length is 10 m.
Protocol: Nokeval SCL
Baud Rates: 300/600/1200/2400/4800/9600/19200

USB:

Connector: USB type B, female
Protocol: Nokeval SCL
Baud Rates: 300/600/1200/2400/4800/9600/19200

Supply voltage

Connector 1: 1.3 mm DC jack, centre positive
Connector 2: detachable screw post connector with 3.81 mm raster, terminal 1 +, terminal 2 -
Connector 4: USB type B, female

Voltage: 8...30 VDC
Current consumption: 60 mA

Environment

Oper. temperature -30...+60 °C
Protection class IP20

LEDs

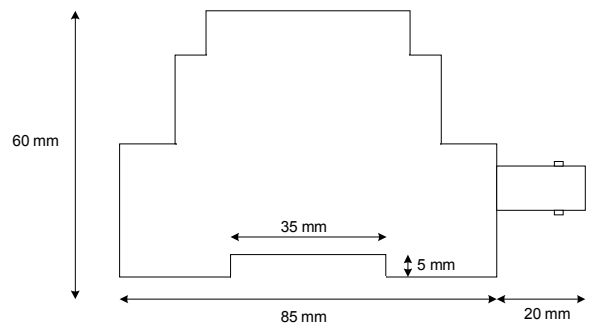
RS: Serial bus indicator
RF: Radio receiver indicator
Power: Power indicator (behind RS and RF LEDs)

Settings

Connection: RS-485, USB or RS-232
Protocol: Nokeval SCL-Meku 1
Software: Mekuwin for Windows 98...XP

Other

External Dimensions case:



antenna: 100 mm, \varnothing 14 mm

Regulations

EMC directive

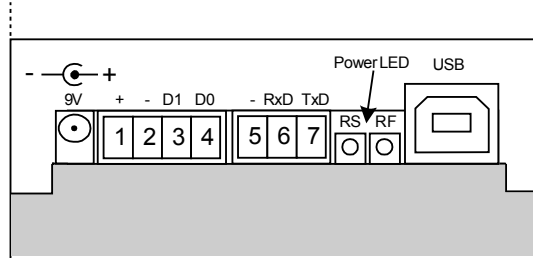
- EMC immunity EN 61326
- EMC emissions EN 61326, class B

R&TTE directive

- EN 300 220 Receiver class 3
- EN 301 489
- EN 300 339

INSTALLING

Connections

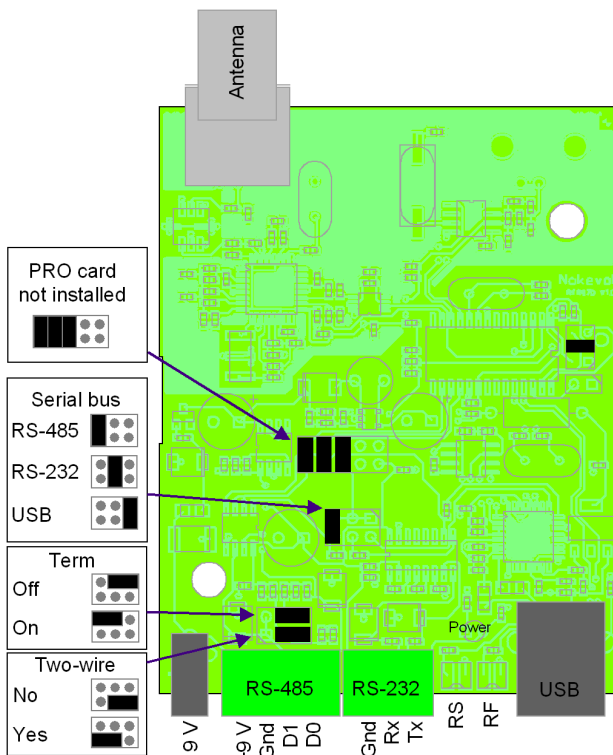


The supply voltage 8...30 VDC is connected using 1.3 mm DC jack (centre connector positive) or by using detachable screw post connector terminals 1 (+) and 2 (-). Both supply voltage connectors are internally connected. The receiver is protected against wrong polarity of the supply voltage. The supply voltage's negative terminal is also used as ground for RS-485 and RS-232.

RS-485 bus is recommended. If necessary RS-485 interface can easily be added to a computer by using Nokeval DCS770 or DCS771 USB - RS-485 converter or RCS770 USB/RS-232 – RS-485 converter. RS-485 bus is connected to terminals 3 (D1) and 4 (D0).

When using Nokeval 711 and 721 serial converters, terminal 3 (D1) is connected to serial converter's terminal A and terminal 4 (D0) to terminal B. When using serial converters not manufactured by Nokeval, connect receiver's terminal 3 (D1) to serial converter's terminal B and terminal 4 (D0) to terminal A.

RS-232 is connected to terminals 5 (GND), 6 (RxD) and 7 (TxD). By default the device is jumpered to use RS-485 bus, so if RS-232 or USB is used, the jumpers must be set to according the picture below. To do this, open the case by pressing in the clips on the sides of the case and lifting up the top part of the case. Set the serial bus jumper to RS-232 or USB position and close the case.



If the master device in RS-485 bus has the common terminal, the "two-wire" jumper must be set to "no" position. If the master device doesn't have the common terminal, like for example Nokeval 711 converter, the jumper must be set to "yes" position.

If the device is the last device on the bus, it is recommended to set the "term" jumper to "on" position. When this jumper is set AC termination is used which means that 1 nF capacitor and 110 ohm resistor are connected in series between the bus wires.

Term and two-wire jumper settings have no effect when RS-232 or USB is used.

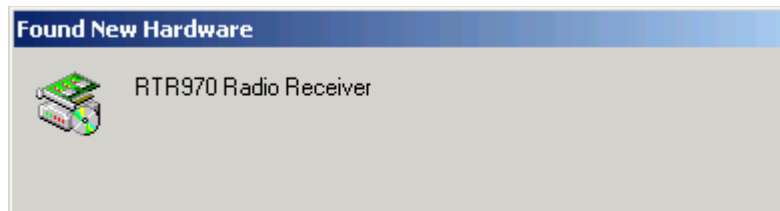
The antenna is connected to the BNC connector at the top side of the case. First align the female connector's two guideposts to the male connector's channels. Then press the BNC connector in and lock the connector by rotating the male connector's outer ring clockwise. If needed, the antenna can be removed by rotating the ring counter clockwise and then pulling out the antenna.

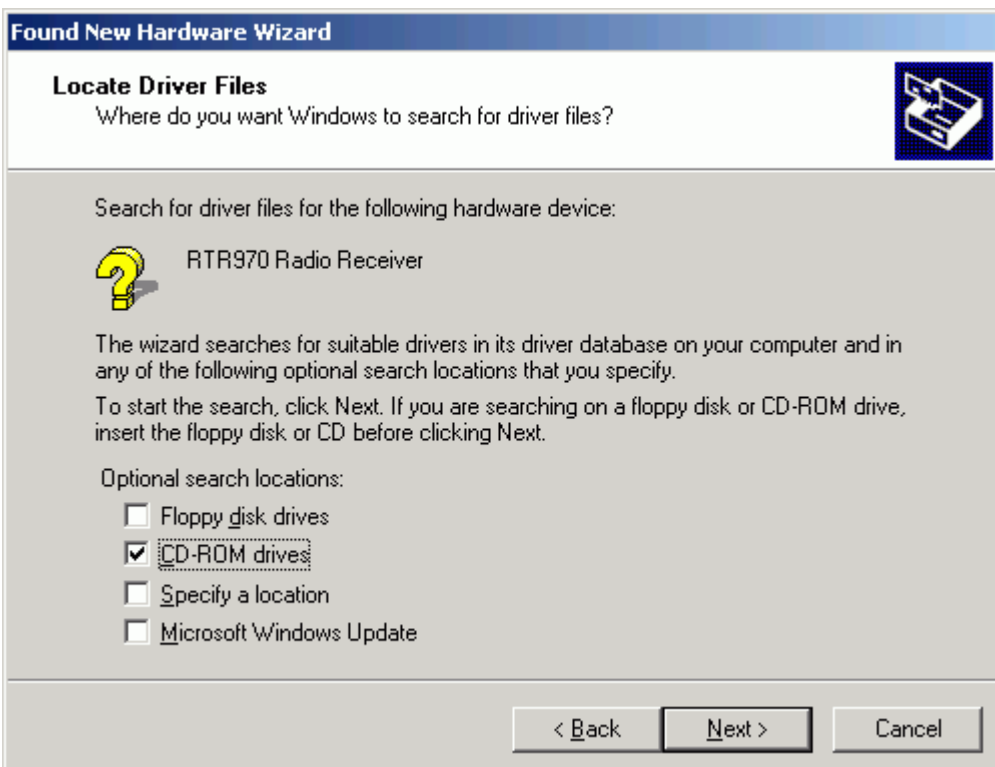
USB Drivers

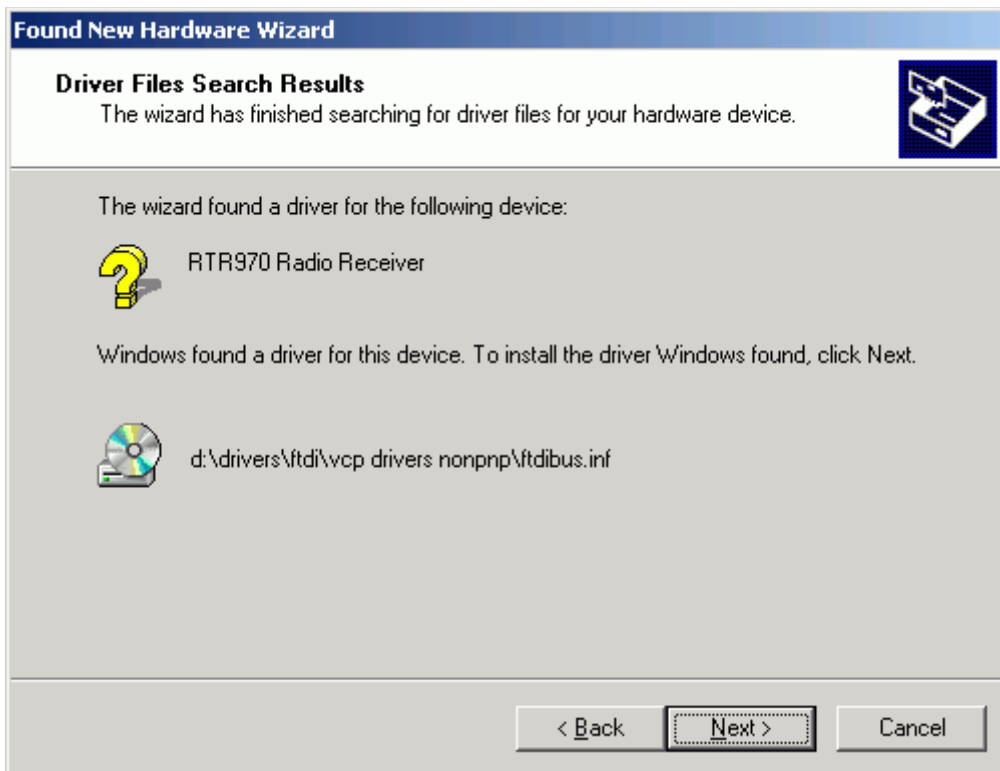
The USB interface chip needs two drivers: one for USB bus and the other to create a virtual serial port.

The drivers can be obtained from a Nokeval Software CD or downloaded from the USB chip manufacturer: www.ftdichip.com (Drivers, FT232BM). The installation below assumes using CD, but using downloaded drivers is quite similar.

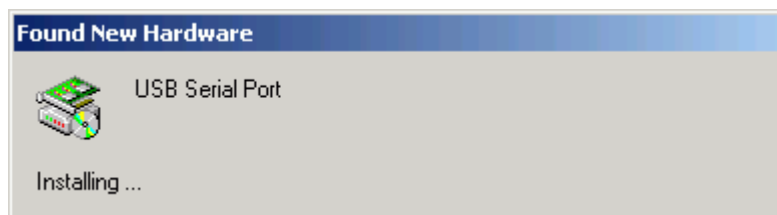
Insert the Nokeval Software CD and plug in the device. Windows should detect it and start installing automatically:







When USB bus driver ftdibus.inf is installed, Windows wants to install the virtual serial port driver, that makes the device look like an ordinary COM port.



Install in the same way as the bus driver.

Finally it is necessary to find out, which COM port represents the device. Open Control Panel, System, Hardware, Device Manager. In the device tree, expand Ports, and there should be USB Serial Port (COM3), for example.



Installation site

To achieve the best signal levels place the RTR970 receiver as close to the transmitters as possible. The receivers RS-485 connection and wide supply voltage range enables the use of connection wires up to 1000 meters in length. In addition, multiple receivers can be connected in parallel on the same RS-485 bus to increase the coverage area. Transmission is received when at least one receiver receives the transmission without errors.

RTR970 is 35 mm DIN rail mountable but desktop use is also possible. The best installation site for the device is a fairly large grounded metal surface that has little surrounding metal walls. The best signal levels are achieved when there is a line of sight to transmitters. Walls and obstacles attenuate the signal and therefore decrease the coverage area. On the other hand, metal surfaces can also cause reflections and increase the coverage area.

Connection settings

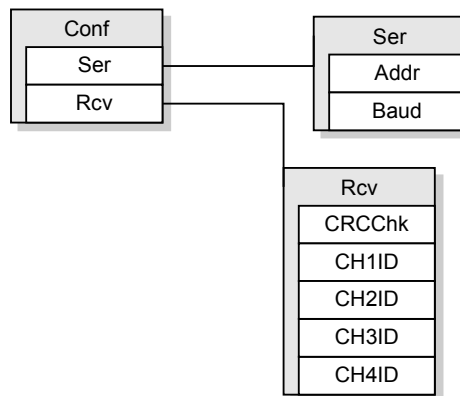
Use Mekuwin program to configure the device. You can download Mekuwin from Nokeval's web site for free.

Default communication settings for configuration:

- Baud rate 9600
- protocol SCL
- address 0

Menu

Menu of RTR970



Serial submenu (Ser)

Serial communication settings. Note that the changes here do not affect until the device is rebooted.

Address

SCL address selection. Allowed addresses are 0...123.

Baud

Baud rate selection. Options are 300, 600, 1200, 2400, 4800, 9600 and 19200.

Receive submenu (Rcv)

CRCChk

If selected, CRC checksum of received data packets is checked and corrupted packets are rejected. The setting is on by default and there is no reason to disable the setting.

CH1ID..CH4ID

Four MTR series transmitters (except MTR260) can be defined to act as certain channel. For example, when RTR970 receives "MEA CH 1?" command it sends latest received data from the transmitter that has been assigned to channel one. To assign a device to channel one, set the transmitter's ID to CH1ID value. Other channels can be assigned in the same way.

SCL PROTOCOL

A more detailed description of the Nokeval SCL protocol can be downloaded from Nokeval www pages <http://www.nokeval.com/manuals/sclmanual.pdf>. Some additional commands have been added to SCL protocol for MTR and RTR series devices that are not covered by the general SCL manual. These commands are explained in the list below.

RTR970 supports the following SCL commands:

TYPE ?

Returns the model name and software version.

SN ?

Returns the device's serial number, for example "A123456"

MEA CH x ?

Returns the last received value from the device that is defined as "channel x".

DBG 1 ?

Returns the oldest unread data packet from the buffer.

DBR 1 xx ?

Returns a data packet from the ring buffer location xx.

DBX

Clears the ring buffer.

DBS 1 ?

Returns the size of the ring buffer.

APPLICATION EXAMPLES

RTR970 and 7470 serial to analog converter

7470 serial to analog converter can be used with a RTR970 receiver to provide four analog output channels.

You only need to connect RS-485 cable between the devices and configure the devices using MekuWin software or 6790 hand held programmer.

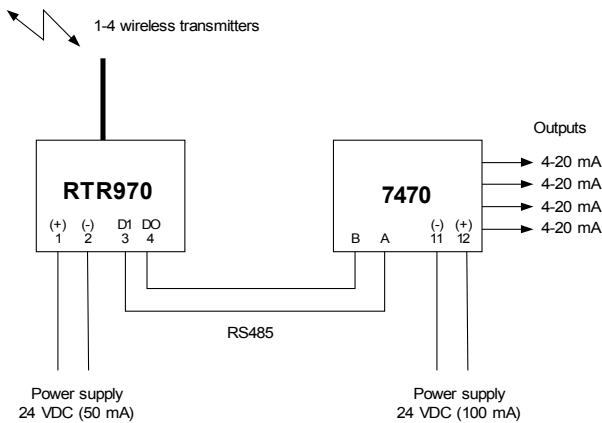
(Note: It is recommended to set the “two-wire” jumper to “yes” position, see page 4).

Configuring 7470

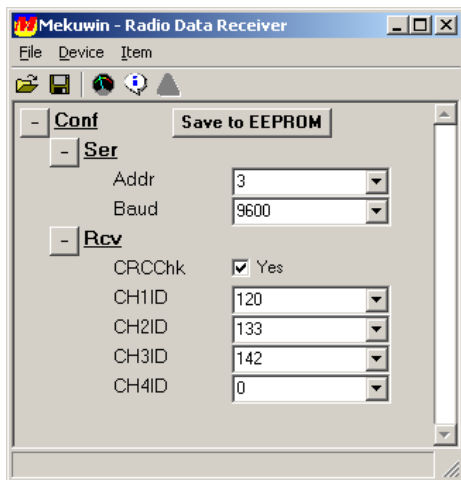
See the 7470 manual for information how to configure the device.

If devices are ordered for wireless transmitters and the necessary information is provided in the order, all jumper and scaling settings can be done at the factory.

Note: 7470 converter supports only wireless transmitters with Pt100 sensor or mA/mV/V-input.



Configuring RTR970



RTR970 has four channels that can be assigned to a certain MTR series wireless transmitter.

Change the address field to some other value than zero (1..123) and enter the ID numbers of the wireless transmitters. Press the “Save to EEPROM” button and reboot the device to activate new serial settings.

Nokeval

**Yrittäjäkatu 12
37100 Nokia
Finland**

**Tel +358 3 3424800
Fax +358 3 3422066
www.nokeval.com**