

# User manual

Firmware versions V1.0-3.1  
10.08.05

## MTR970 Radio data receiver



**Nokeval**

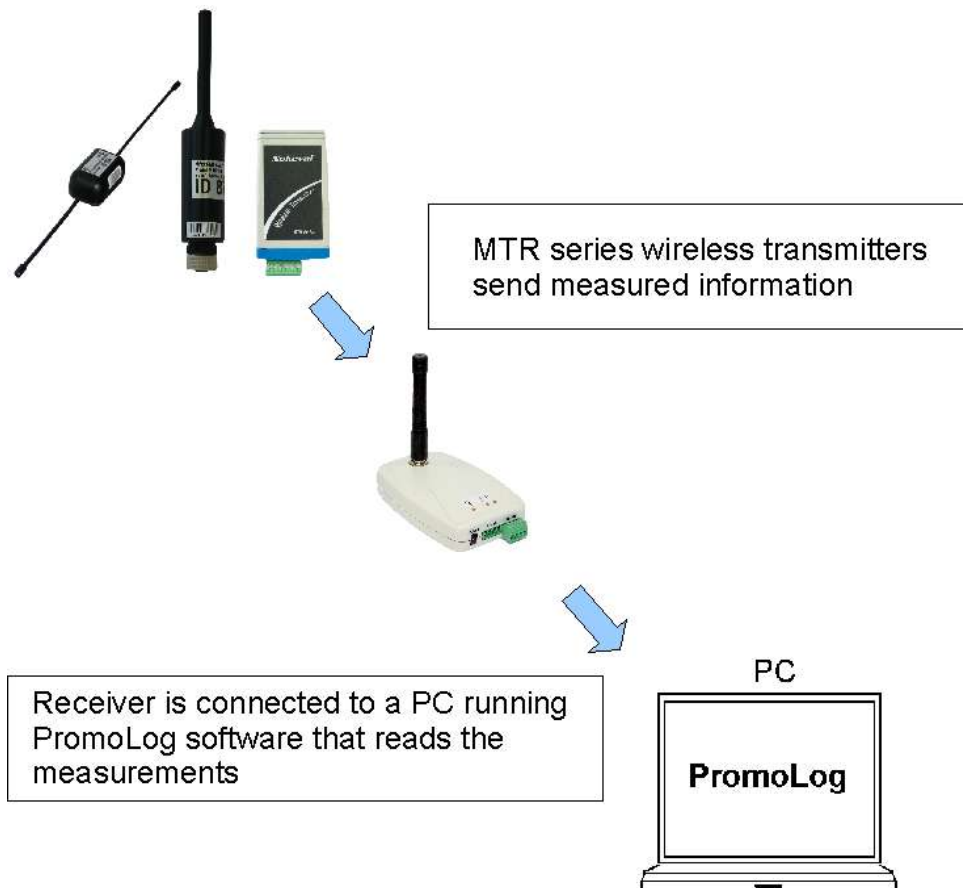
# DESCRIPTION

MTR970 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.

MTR970 uses license free 433.92 MHz frequency band (ISM) so it can be freely used, for example, almost in whole Europe.

MTR970 is designed for desktop use but it can also be installed, for example, upside down to a ceiling or to a cable rack. The receiver is connected to a computer using RS-485 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)  
Polarization: Vertical  
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 8 D0, terminal 7 D1.  
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, combined with power supply, terminal 4 TxD, terminal 3 RxD.  
Maximum cable length is 10 m.  
Protocol: Nokeval SCL  
Baud Rates: 300, 600, 1200, 2400, 4800, 9600, 19200

## Supply voltage

Connector 1: 1.3 mm DC jack, centre conductor positive

Connector 2: detachable screw post connector with 3.81 mm raster, terminal 1 +, terminal 2 -

Connector 3: detachable screw post connector with 3.81 mm raster, terminal 5 +, terminal 6 -

Voltage: 9...30 VDC

Current consumption: 40 mA

## Environment

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

## LEDs

ON: Power indicator  
RS: Serial bus indicator  
RF: Radio receiver indicator

## Settings

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

## Other

### External Dimensions

case: 115 mm x 75 mm x 25 mm  
antenna: 87 mm, Ø 14 mm

## Regulations

### EMC directive

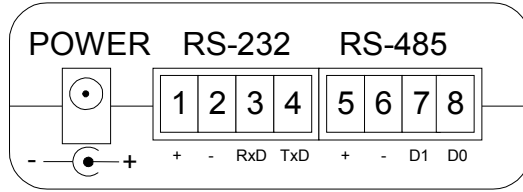
- EMC immunity EN 61326
- EMC emissions EN 61326, class B

### R&TTE directive

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

# INSTALLING

## Connections

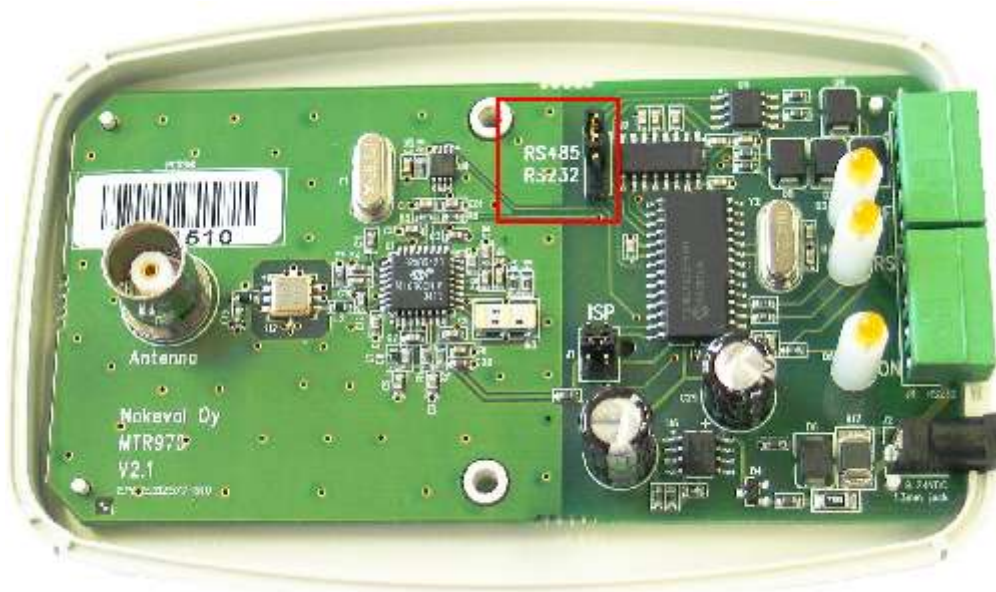


The supply voltage 9...30 VDC is connected using 1.3 mm DC jack (centre connector positive) or by using detachable screw post connector terminals 1 (+) and 2 (-) or 5 (+) and 6 (-). All supply voltage connectors are internally connected. The receiver is protected against wrong polarity of the supply 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 7 (D1) and 8 (D0).

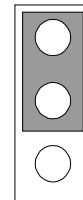
When using Nokeval 711 and 721 serial converters, terminal 7 (D1) is connected to serial converter's terminal A and terminal 8 (D0) to terminal B. When using serial converters not manufactured by Nokeval, connect receiver's terminal (D1) to serial converter's terminal B and terminal 8 (D0) to terminal A.

RS-232 is connected to terminals 2 (GND), 3 (RxD) and 4 (TxD). By default the device is jumpered to use RS-485 bus, so if RS-232 is required the jumper must be set to RS-232 position. To do this, screw off the two screws from the bottom of the case and remove the top part of the case. Set the jumper to RS-232 position and close the case.

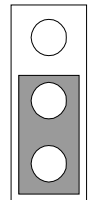


RS-485

RS-232



default



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.

## Installation site

To achieve the best signal levels place the MTR970 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 to RS-485 bus to increase the coverage area. Transmission is received when at least one receiver receives the transmission without errors.

MTR970 is designed for desktop use but it can also be installed, for example, upside down to a ceiling or to a cable rack. 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. The device can be secured using plastic cable ties or two-sided tape. Do not use metal fastenings if they cover any part of the case.

# SETTINGS

## Connection settings

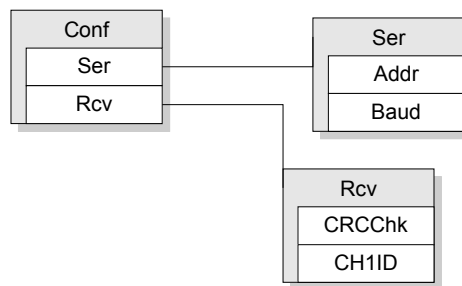
Use Mekuwin program to configure the device. You can download Mekuwin from Nokeval's web site for free.

Default communication settings for configuration:

- Baud rate 9600
- protocol SCL
- address 0

## Menu

Menu of MTR970



## 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

One MTR series transmitter (except MTR260) can be defined to act as channel one. When MTR970 receives "MEA CH 1 ?" command it sends latest received data from transmitter that has been mapped to channel one. To map a device to channel one, set the transmitter's ID to CH1ID value.

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# SCL PROTOCOL

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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.

MTR970 supports the following SCL commands:

**TYPE ?**

Returns the model name and software version.

**SN ?**

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

**MEACH 1 ?**

Returns the last received value from the device that is defined as "channel 1".

**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.

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