RACOM

...the broadest narrowband money can buy
RADIO DATA NETWORKS

Radio modems

MR400 MR300 MR160

The **MR radiomodem** is a **flagship product** of MORSE system HW components. MR radiomodems prove their quality in hundreds of different applications under various climatic conditions (from the Arctic Circle to the Equator) in tens of countries around the world. They successfully substituted older radiomodem model MR25, which RACOM produced tens of thousand pieces.

Characteristic of the MR radio modem is the modular concept: all types of serial interfaces, Ethernet, GPS or I/O module are available. Its one-piece, highly resistant mechanical construction (metal casting) allows extended number and types of input and output interfaces. These features make the MR radio modems unique and they create a qualitatively new category of wireless devices in the world.

General areas of use

- **Packet networks** with frequent transmission (up to **10 packets / sec**) of short messages (optimally 300 B, up to 1 600 B) with minimum transfer time (**90 ms / 100 B / 1 hop**)
- **Mission critical application**
- **Telemetry systems** (SCADA)
- **Transaction networks** (payment and lottery terminals, ATM cash machines)
- **Security systems**
- **Mobile networks** (monitoring vehicles, transmission of data from/to vehicles, ships, trains, etc.)
- **Range of up to tens of kilometres** (direct line of sight is not required)
- Possibility of creating extensive wide-area (**nation-wide**) and large-scale networks with **thousands of points**

Features

- Modulation transfer rate of **21,68 kbps**
- **Rx/Tx** switching time (**< 1,5 ms**)
- Configurable **RF power 0,1–5 W** (a version of **MR160** up to **25 W** available)
- **Modular concept** – 5 slots:
  - up to **4 serial interfaces** – RS232, 422, 485 (optically separated)
  - **Ethernet**
  - **I/O module** (digital and analog inputs and outputs)
  - **GPS** (Outputs: NMEA-0183, Configurable Time pulse; Input: 1 digital)
- Mechanical resistance (**metal casting**)
- Suitable for **mobile installations** (complies with EHK10)
- DIN rail or 4 × M4 screws mounting
- Complies with **ETS 300113, FCC, RSS**
- Highly efficient firmware

Description

Radio part

MR radio modems use well tried, long-term tested RACOM concepts of independent four phase locks and 4state FSK modulation. However all circuits have been significantly modernized. Due to the great experience (particularly the speed/sensitivity ratio) the signaling rate of 21,68 kbps for a bandwidth of 25 kHz is still used. The radio modems are also manufactured for a bandwidth of 12,5 kHz with signaling rate of 10,84 kbps. The transmit/receive switching time has been decreased to under 1,5 ms.
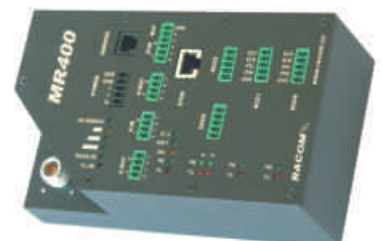
Firmware

- The core of the operating system and libraries are common for all MR radio modems, MC100, MG100
- Guaranteed backward compatibility with MR25 radio modems on radio channel level, protocol level and interface for connecting applications
- The computing performance and memory capacity of communication processor allows:
    - implementation of new complicated protocols
    - creation of virtual pictures of telemetric networks in centres
    - implementation of IP environment without compromises
    - increase of diagnostic and testing tools

Control and diagnostics

The setup and control of radio modems, MC100, MG100 and the entire network is done by using programs for MS Windows and Linux supplied by RACOM **free of charge**. Programs communicate via serial port or over the IP interface on Ethernet either with the connected device or with any radio modem in the network.

With our control programs you can set up and diagnose the following features of the firmware:

- parameters of the **radio part** (frequency, RF output power...)
- **communication** parameters (addresses, access parameters to the radio channel, modulation...)
- **user interface** (parameters of serial ports, Ethernet and user protocols)
- **service** information (overall state of device, real time, error messages, memory occupancy...)
- **monitoring** operation on the radio channel, serial ports and Ethernet
- **statistics** (information about the amount and size of transmitted/received packets, amount of repeated/lost packets on individual lines, quality of audibility of other stations
- **tests** enabling diagnostics of the quality of individual lines, error rate measurements, time responses, simulation of random loading of individual lines and the entire network, etc.
- it is possible to **save** and **repeatedly use** a file with the complete **configuration** of the device
- the firmware can be **locked** at several levels against **unauthorized use**

Technical parameters

Type	
Frequency range	MR160: 136–180 MHz
	MR300: 290–380 MHz
	MR400: 380–470 MHz
Channel spacing	25 kHz or 12,5 kHz
Means of setting working frequency	software; in range of 3,2 MHz
Switching time transmit/receive	< 1,5 ms
Receiver sensitivity for BER 10^{-3}	better than -107 dBm
Software adjustable output power	0,1–5 W (a version of MR160 up to 25 W available)
Max. modulation rate for transmitting	21,68 kbit/s in 25 kHz channel
	10,84 kbit/s in 12,5 kHz channel
Optional modules	1 slot – opt. sep. 1 × RS232 or 1 × RS422/RS485 or GPS
	2 slot – opt. sep. 1 × RS232 or 1 × RS422/RS485 or GPS
	3 slot – 2 × RS232
	4 slot – Ethernet 10/100 Mbps
	5 slot – digital/analog inputs/outputs
Antenna connector	N-female
MTBF (Mean Time Between Failures)	> 100 000 hodin
Supply voltage	typically 13,8 V (10,8–15,6)
Power consumption	Rx 380 mA (eth +40 mA, I/O +50 mA, GPS +15 mA)
	2,5 mA in sleep mode
	Tx 1,6 A / 1 W; 2,0 A / 5 W
Operating temperature range	-25 to +55 °C
Mechanical dimensions	208 × 108 × 63 mm
Weight	1,2 kg
Standards complied	
Radio parameters	ETSI EN 300 113-1 V1.4.1:2002; FCC part 90, RSS 119
EMC (Electromagnetic Compatibility)	ETSI EN 301 489-5 V1.2.1:2000
Electrical safety	CSN EN 60 950:2001
Wheeled vehicles usage	UN Regulation No.10 (EHK No.10)