MR400

Technical parameters

Radio parameters

Types [1]	Half-duplex	Full-duplex	Frequency
	MR070	MD070*	69 - 85 MHz
	MR160	MD160	135 - 175 MHz
	MR300	MD300*	290 - 350 MHz
	MR400	MD400*	350 - 470 MHz
Tuning range	3.2 MHz		
Channel spacing [3]	12,5 / 25 / 200 kHz		
Frequency stability	+/- 1.0 ppm		
Modulation	4CPFSK / 12,5 and 25 kHz; 2CPFSK / 200 kHz		
Data rate	10.84 kbps / 12.5 kHz		
	21.68 kbps / 25 kHz		
	132.0 kbps / 200 kHz		
Carrier output power [1] [3]	0.1 W - 5 W; 0.1 W - 25 W		
Sensitivity for BER 10e-6	-110 dBm / 10.84 kbps / 12.5 kHz		
	-105 dBm / 21.68 kbps / 25 kHz		
	-100 dBm / 132.0 kbps / 200 kHz		

Electrical

Primary power	13.8 V (10.8 - 15.6 V)
Rx [2]	380 mA (Eth +40 mA, I/O +50 mA, GPS +15 mA)
Tx [2]	1.6 A / 1 W; 2.0 A / 5 W; 5.5 A / 25 W
Sleep mode	2.5 mA

Interfaces

5 slots	Ethernet
	2x RS232, 1x RS232, 1x RS232i, 1x RS422/485i,
	GPS, M-BUS, I/O - 2×DI, 2×DO, 2×AI, 2×AO,

Enviromental

Temperature	-30 to +70 ℃ (-22 to +158 ℉)
Humidity	5 to 95% non-condensing

Mechanical

Casing	Rugged die-cast aluminium
Dimensions	208 W × 108 D × 63 H mm (8.19 x 4.25 x 2.48 in)
Weight	1.2 kg (2.65 lbs)

SW

User protocols on COM	More than 70 protocols - Modbus, IEC101, DNP3,Comli, DF1, Profibus,
User protocols on Ethernet	Modbus TCP, IEC104….
Multi master applications	Yes
Report by exception	Yes
Collision Avoidance Capability	Yes
Repeaters	Store-and-forward; Every unit; Unlimited number

Diagnostic and Management

Radio link testing	RSS, DQ, Homogenity
Statistic	Rx/Tx packets on User interfaces and for User data
	and Radio protocol (Repeats, etc.) on Radio channel
Network management	RANEC software

Approvals

Radio parameters	CE, FCC part 90, RSS119
Use in automotive environments	ECE Regulation 010.00
Vibrations	EN 61 373

[1] Please contact us to check availability of specific types and frequencies. Types marked * can be manufactured individually when ordered in significant volumes.

[2] Values depend on frequency and modem type.

[3] HW option

General

MR400 is a well proven **radio modem**, on the market for over a decade and undisputably well established. Tens of thousands units serve reliably around the world, from the poles to the equator.

MR400 uses a sophisticated anti-collision protocol on the Radio channel. Its unbeatable network performance is boosted by the unique implementaion of proprietary SCADA protocols from all significant vendors on the SCADA market.

Thanks to MR400 extraordinary intelligence, speed and switching time, they are suitable for all types of networks where emphasis is placed on speed and reliability, such as SCADA & Telemetry for utility distributions (water, electricity, oil&gas), SmartGrid power networks, Transaction networks like lottery, ATM or POS, mobile networks including mission-critical fleet management and many other applications.
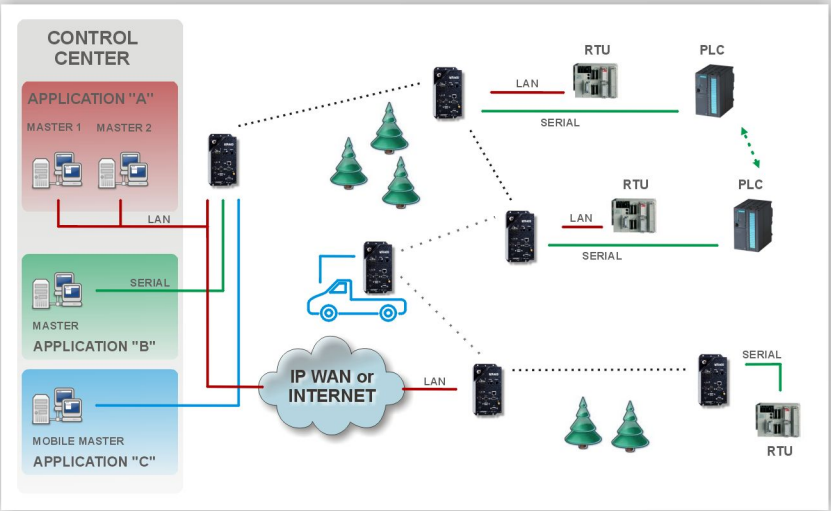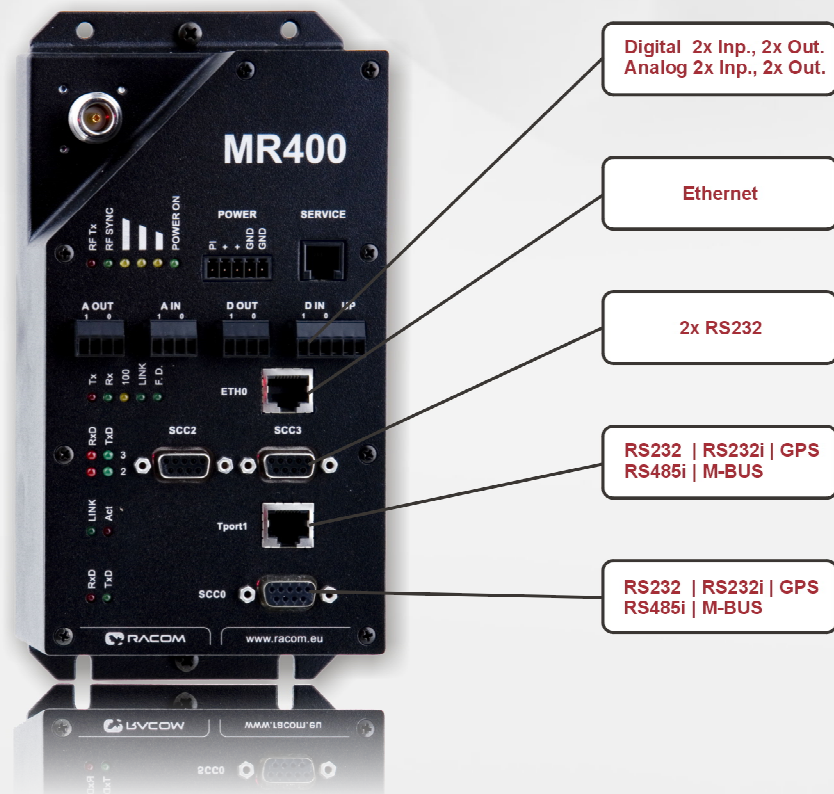
Radio modem

- 70, 160, 300, 400 MHz
- 22 kbps/25 kHz
- 5 or 25 W
- 1x ETH, 4x COM, I/O
- Automatic back-up routes
- Mobile networks
- Network management SW

Applications

- Water
- Oil & Gas
- Electricity
- Smart grid
- POS & ATM
- Lottery
- Weather
- Transportation
- Others

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MR400

MR400

Digital 2x Inp., 2x Out.
Analog 2x Inp., 2x Out.

Ethernet

2x RS232

RS232 | RS232i | GPS
RS485i | M-BUS

RS232 | RS232i | GPS
RS485i | M-BUS

Radio Modem

Fast to configure and diagnose

Ⅴ **Setr** - special Windows or Linux application for configuration
Ⅴ The fastest and most robust remote access with minimum data over the network
Ⅴ Monitoring of User interfaces and Radio channel, either locally or remotely
Ⅴ On line as well as historical statistics for all interfaces and Radio channel

RANEC - Network Management

Ⅴ Collects statistics from all units and save them in database
Ⅴ Extra load generated by RANEC is automatically regulated based on user traffic
Ⅴ **One server + unlimited number of graphical clients**
Ⅴ Possible to display all statistics in graphs
Ⅴ Displays the network topology on a background map
Ⅴ Network planning - it calculates the coverage using digital model of the terrain

Security

Ⅴ Licensed radio bands
Ⅴ **FEC**, interleaving, proprietary data compression
Ⅴ **CRC32** data integrity control on Radio channel
Ⅴ Proprietary protocol on Radio channel with packet acknowledgement
Ⅴ **Blowfish 160** encryption
Ⅴ **Netlock** - application which enables/disables remote access to the unit for three level of users

Reliability

Ⅴ Every single unit **tested in a climatic chamber** as well as in real traffic
Ⅴ **Military or industrial grade components** are used
Ⅴ Industrial die cast aluminum case
Ⅴ -30 to +70 ℃ (-22 to +158 ℉)

Energy savings

Ⅴ **Sleep mode** - 2.5 mA, controlled via a digital input
Ⅴ Power down - unit boots within 3 sec. after power up

Other Highlights

Ⅴ DIN rail, flat or 19" rack mounting
Ⅴ CE, FCC approvals
Ⅴ Vibration - EN 61 373

Data speed & Network throughput

Ⅴ 132 kbps / 200 kHz
Ⅴ **22 kbps / 25 kHz**
Ⅴ 11 kbps / 12,5 kHz
Ⅴ Polling, Report-by-exception, Mesh
Ⅴ Throughput limits for 22 kbps/25 kHz:
   - 600 Bytes/sec. in collision environment of all units within one radio coverage area
   - 10 packets/sec. (for packets shorter than 60 Bytes)
   - 15 kbps user data rate for point-to-point link

User protocols

Ⅴ **More than 70 protocols - Modbus, IEC101, DNP3, Comli, DF1, Profibus, Modbus TCP, IEC104….**
Ⅴ **Cache mode** - speeds up polling protocols
Ⅴ SCADA serial protocol addresses are mapped to MR400 addresses
Ⅴ TCP (UDP) protocols (e.g. IEC104) are handled transparently
Ⅴ Each packet is acknowledged on Radio channel
Ⅴ Sophisticated anti-collision protocol on Radio channel => report by exception from remotes, simultaneous multi master polling

Ultimate OS

Ⅴ No Linux
Ⅴ No Windows
Ⅴ **Extremely fast booting** (3 sec.)

Modular

Ⅴ 5 slots for modules:
   Ethernet, GPS, M-BUS
   2x RS232, 1x RS232, 1x RS232i, 1x RS422/485i,
   I/O - 2×DI, 2×DO, 2×AI, 2×AO,

Coverage

Ⅴ 70, 160, 300, 400 MHz bands, no direct line of sight required
Ⅴ Carrier output power **0,1-5 W** or **0,1-25 W**
Ⅴ Exceptional data **sensitivity: -105 dBm / 22 kbps / 25 kHz**
Ⅴ Max. distance **more than 50 km**
Ⅴ High resistance to multi path propagation and interference (CPFSK modulation)
Ⅴ **Every** can work **simultaneously as a repeater**
Ⅴ **Hybrid networks**: - any IP network (Internet,3G/GPRS etc.) can interconnect MR400 units
Ⅴ **Unlimited number of radio hops**

Mobile network

Ⅴ Connection-less Mobile mode in Radio protocol
Ⅴ **Every stationary unit can serve simultaneously as a Base station for mobiles**
Ⅴ Cell architecture: automatic instant hand-over, each individual packet from mobile is delivered via the best Base station at the moment
Ⅴ Central MR400 maintains a list of "mobile-base" connections, updated with every packet, to enable communication from the centre to mobiles

RANEC - Network Management