

MRX3 MRX5

Modular industrial router



MRX - the flexible power

High-performance and convertible for individual solutions

The smart MRX routers combine IT security at KRITIS level, state-of-the-art technology, high computing power, elaborate administration and programmability.

Freedom of arrangement

Changing requirements demand flexible solutions. The modularity of the MRX router series allows you to assemble a custom router for each individual application.

Extension options

The basic variants DSL, LTE and LAN are each available in two housing widths and have two digital inputs. Modular plug-in cards (MRcards) with additional interfaces can be added as required. In addition to the standard models, customer-specific MRcards can also be developed.

Future-proof

With the plug-in cards for the MRX router you will be on the safe side in the future as well. We are constantly expanding our product range in line with the latest developments and customer requirements. In the case of technology upgrades, e.g. to 5G, you can therefore expand your router efficiently and at low costs.

Highlights:

This VPN router offers the following impressive highlights:

- High performance and high VPN data rate
- Modular expandability through plug-in cards (MRcards)
- Connection redundancy also in hardware (4G, DSL, LAN)
- 5 Ethernet ports (expandable to 17)
- 2 digital inputs (basic versions, expandable)

On board thanks to the operating system **icom OS**:

- Comprehensive IT security functions
- Connection redundancy incl. multiple VPNs
- Comprehensive network functionality with multiple IP networks
- Integrated edge computing and IoT functions

MRX (Basic Variants)

Technical Data

Mobile communication (only MRX LTE)	
Frequency bands	4G/LTE*: 800, 900, 1.800, 2.100, 2.600 MHz; LTE Cat. 3 (DL: 100 Mbps, UL: 50 Mbps) 3G/UMTS/HSPA: 900, 1.800, 2.100 MHz; UMTS, HSPA+ (DL Cat. 24, UL Cat. 6) 2G/GPRS/EDGE: 900, 1.800 MHz; GPRS/EDGE Class 12
Antenna connection	2x SMA female (2G/3G/4G: Main, 3G: Rx Diversity, LTE: MIMO)
SIM	Slot for 1 Mini-SIM card (2FF), locked
Wire-bound VDSL/ADSL communication (only MRX DSL)	
DSL standards	MRX DSL-A (Annex A): <ul style="list-style-type: none"> ■ VDSL2 G.993.2 Profile 8a, 8b, 8c, 8d, 12a, 12b, 17a, 30a, VDSL2 Vectoring G.993.5 ■ ADSL/ADSL2/ADSL2+ G.992.1 Annex A, G.992.3. Annex A/L/M, G.992.5 Annex A and M, T1.413 MRX DSL-B (Annex B): <ul style="list-style-type: none"> ■ VDSL2 G.993.2 Profile 8a, 8b, 8c, 8d, 12a, 12b, 17a, 30a, VDSL2 Vectoring G.993.5 ■ ADSL/ADSL2/ADSL2+ G.992.1 Annex B, G.992.3. Annex B, G.992.5 Annex B and J
DSL connection	RJ45 connector
Router	
Function	Up to 5 IP local networks (LAN) or as WAN with both, DHCPv4 and DHCPv6 clients, with static IP addresses, VLAN incl. tags and trunk ports; SLAAC, router advertiser, own DHCPv4 and DHCPv6 server per IP network; static routing, configurable routing priority; dynamic routing OSPF, BGP, RIP, RIPv2, RIPv2, RIPv2; net filters: D-NAT, S-NAT, IP/port forwarding, netmapping, DNS relay, dynDNS support; PPPoE for external DSL modem, PPPoA (only MRX DSL); Dual APN: cellular traffic division across 2 APNs - e.g. for separating payload and management data
Security	OpenVPN (client and server), IP filters (stateful firewall) also in VPN tunnel, several VPN tunnels in parallel possible, IPsec, GRE (incl. multi-port), DMVPN, PPTP server
Redundancy	WAN chains: several WAN accesses configurable (prioritised and event-controlled), WAN groups: parallel operation of WAN interfaces or VPNs, several OpenVPN servers, additional redundancy via further MRcards; provider redundancy when using a multi roaming SIM card (see chapter "suitable accessories")
Ethernet switch, interfaces	
Ports	5 x RJ45, 10/100 MBit/s, Full/half duplex, Auto MDI-X, 1.5 kV isolation voltage
Function	Each port can be freely assigned to the IP networks, Link up/down detection, configuration port
Inputs	In basic variants: 2 digital inputs, monitorable status, 1x low active, connection to GND, 1x high active, connection to 10 ... 24 V DC, as per EN 61131-2, type 1
Events (selection)	Change: input, Ethernet port, WAN chain, profile, supply input, cellular field strength; timer expiry, firewall violation, login attempt detection, pulse sequence at digital input, counter
Event-controlled actions (selection)	E-mail messages, SMS, SNMP traps, MCIP, start timer, profile switching, connection switching, reset, log out/turn off modem, activate firmware, pulse sequence
Operation	
Wizards	Configuration of connection incl. VPN, adding LAN networks, quick start of icom Connectivity Suite – VPN
Help	Web interface with inline help texts, online help, FAQ, exemplary profiles, plausibility check
Configuration	Web interface local and remote (http, https; with session management), Command line interface (CLI), Telnet, SSH, ASCII and binary file (also for backup), configuration management with switchable profiles (event-controlled)
Indications (LEDs)	Power, WAN (Internet connection), Info (configurable), Signal (with cellular radio), DSL (with DSL)
Authentication	Several users, different user roles and rights, RADIUS
Diagnosis	Comprehensive log files, support package, integrated help functions, Diagnosis tools: ping, tcpdump, traceroute, DNS lookup, AT commands
Firmware updates	Incremental, fail-safe, automated via update server (http, ftp, https, ftps)

* Please check the availability of the LTE frequencies in the planned operating area.
Above specified frequencies are currently used in Europe, Middle East, Africa and, to some extent, in the Asia-Pacific region and South America.

MRX (Basic Variants)

Technical Data

Edge Computing		
icom SmartBox	Linux programming environment: creation of LXC containers for programs and scripts (apps), ARMv7 CPU, 448 MB RAM, 7 GB flash memory	
Additional features	NTP client and server, buffered real-time clock	
Supply		
Voltage	12 ... 24 V DC (± 20%), 2 supply connections with changeover detection	
Terminals	5-pin push-in terminal connectors (maintenance free), rigid/flexible conductors up to 2.5 mm ¹	
Power consumption (basic variants without further MRcards)	MRX DSL: typical approx. 6.5 W, max. 8.0 W MRX LAN: typical approx. 2.0 W, max. 3.5 W MRX LTE: typical approx. 2.5 W, max. 8.0 W	(depending on data throughput amongst others)
Ambient conditions		
Dimensions (WxDxH)	MRX3: 82 x 88 x 117 mm	MRX5: 136 x 88 x 117 mm
Operating temperature MRX LAN, MRX LTE	-30...+75 °C ¹	
Operating temperature MRX DSL	-25...+60 °C ²	
Humidity	0...95% (non-condensing)	
Mounting / protection class	DIN rail mounting / housing: IP40	
Approvals & Standards		
Certifications	CE, MRX LAN additionally: FCC Part 15 Class B, IC	
EMC	Emission: EN 55032 Class B; Immunity: EN 61000-6-2, EN 55024	
Safety	IEC/EN 60950, 62368	
Environmental conditions	Vibration/shock as per PLC standard EN 61131-2 and EN 60068-2-6, EN 60068-2-27; Temperature tests as per EN 60068-2-1, EN 60068-2-2, EN 60068-2-14, EN 60068-30	

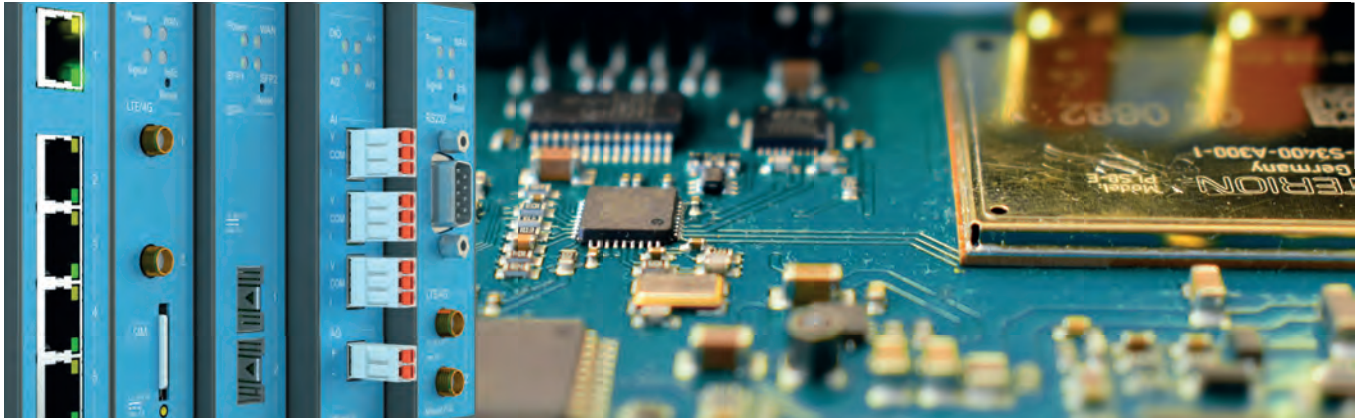
¹ Range +70...+75 °C: under restricted conditions (refer to: www.insys-icom.com/restricted)

² Ranges -25 ... 0°C and 55°C ... 60°C under restricted conditions (refer to: www.insys-icom.com/restricted)

Note: range 55°C ... 60°C only without further MRcards PD or PL

MRcards

Modular plug-in cards for MRX series routers



Individual functionality

Combine MRcards with different functions, exactly fitting for your application!

Fail-safe internet connection

Combine any combination of DSL, mobile telephony and fiber optics and thus realize all necessary fallback options.

All in one device

By bundling several functions, you save costs and space in the control cabinet. The administration of your systems also becomes more efficient, uniform and secure.

Efficient upgrades

If changes are required, you can add desired MRcards directly in your application. You keep the MRX device with the known configuration. Even future technology upgrades remain efficient: e.g. a switch to 5G mobile radio.



MRcard **PL**

- Cellular radio
- 2 digital inputs



MRcard **PD**

- VDSL2
- ADSL2/2+
- 2 digital inputs
- 2 variants (-A, -B)



MRcard **ES**

- 4-port switch (10/100 MBit)



MRcard **SI**

- RS232
- RS485
- 2 digital inputs
- 2 switch outputs



MRcard **PLS**

- Cellular radio
- incl. US variant
- RS232
- 2 digital Inputs
- 1 digital output



MRcard **IO**

- 3 analogue inputs
- 1 analogue output
- 4 digital inputs
- 4 digital outputs



MRcard **Fiber**

- 2x Gigabit SFP
- 2 digital inputs



MRcard **WLAN**

- WLAN Access Point and Client
- 2.4 GHz and 5 GHz

MRcards

Technical Data

MRcard PL (Cellular radio)

Mobile communication	
Frequency bands	4G/LTE*: 800, 900, 1.800, 2.100, 2.600 MHz; LTE Cat. 3 (DL: 100 Mbps, UL: 50 Mbps) 3G/UMTS/HSPA: 900, 1.800, 2.100 MHz; UMTS, HSPA+ (DL Cat. 24, UL Cat. 6) 2G/GPRS/EDGE: 900/1.800 MHz; GPRS/EDGE Class 12
Antenna connection	2x SMA female (2G/3G/4G: Main, 3G: Rx Diversity, LTE: MIMO)
SIM	Slot for 1 Mini-SIM card (2FF), locked
Indications (LEDs)	Power, WAN (Internet connection), Signal (cellular radio), Info (configurable)
Inputs	
Inputs	2 digital inputs for configurable actions, 1x low-active, 1x high-active (as per EN 61131-2, Type 1)
Supply / environmental conditions	
Voltage	Supplied via MRX, 2 further supply connections optional (redundancy) 12 ... 24 V DC ($\pm 20\%$)
Power consumption	typical approx. 1.0 W, max. 5.0 W
Operating temperature	-30 ... +75 °C ¹
Weight	80 g
Certifications	CE

MRcard PD (VDSL/ADSL)

Wire-bound VDSL/ADSL communication	
DSL standards	MRcard PD-A (Annex A): <ul style="list-style-type: none"> ■ VDSL2 G.993.2 Profile 8a, 8b, 8c, 8d, 12a, 12b, 17a, 30a, VDSL2 Vectoring G.993.5 ■ ADSL/ADSL2/ADSL2+ G.992.1 Annex A, G.992.3. Annex A/L/M, G.992.5 Annex A and M, T1.413 MRcard PD-B (Annex B): <ul style="list-style-type: none"> ■ VDSL2 G.993.2 Profile 8a, 8b, 8c, 8d, 12a, 12b, 17a, 30a, VDSL2 Vectoring G.993.5 ■ ADSL/ADSL2/ADSL2+ G.992.1 Annex B, G.992.3. Annex B, G.992.5 Annex B and J
Function	PPPoE, PPPoA
DSL connection	RJ45 socket
Inputs	2 digital inputs for configurable actions, 1x low-active, 1x high-active (as per EN 61131-2, Type 1)
Indications (LEDs)	Power, WAN (Internet connection), Info (configurable), DSL
Supply / environmental conditions	
Voltage	Supplied via MRX, 2 further supply connections optional (redundancy) 12 ... 24 V DC ($\pm 20\%$)
Power consumption	approx. 5.0 W
Operating temperature	-25°C ... +60°C ²
Weight	80 g
Certifications	CE

MRcard ES (Ethernet Switch)

Ethernet switch	
Ports	4 x RJ45, 10/100 MBit/s, full/half duplex, Auto MDI-X, 1.5 kV isolation voltage
Function	Each port can be freely assigned to the IP networks, link-up/down detection
Supply / environmental conditions	
Voltage	Supplied via MRX
Power consumption	typical approx. 1.0 W, max. 1.5 W
Operating temperature	-30 ... +75 °C
Weight	70 g
Certifications	CE, FCC Part 15 Class B, IC

¹ Range +70...+75 °C: under extended conditions (refer to: www.insys-icom.com/extended)

² Ranges -25 ... 0°C and 55°C ... 60°C under extended conditions (refer to: www.insys-icom.com/extended)
 Note: range 55°C ... 60°C only without further MRcards PD, PL or Fiber

* Please check the availability of the LTE frequencies in the planned operating area.
 Above specified frequencies are currently used in Europe, Middle East, Africa and, to some extent, in the Asia-Pacific region and South America.

MRcards

Technical Data

MRcard SI (serial)

Serial interface	
RS232 (Serial1)	1 x RS232 / D-Sub-9 (m)
RS485 (Serial2)	Terminal connector (D+, D-, GND), termination and bias via DIP switch
Functions	Serial-Ethernet gateway (incoming and outgoing connections, Modbus TCP/RTU gateway, modem emulation, editable AT answer list, phone number conversion to IP addresses)
USB 2.0	Prepared, USB 2.0 host, socket type A, output current max. 200 mA
Inputs / Outputs	
Digital inputs	2 digital inputs, monitorable status, high active, connection to 10 ... 24 V DC, as per EN 61131-2, type 1, push-in terminal connectors
Digital outputs	2x via terminals, potential-free change-over relay, switchable via action
Indications (LEDs)	Condition of digital inputs and outputs
Supply / environmental conditions	
Voltage	Supplied via MRX
Power consumption	typical approx. 1.0 W, max. 2.5 W
Operating temperature	-30 ... +75 °C
Terminals	Push-in terminal connectors (maintenance free), rigid/flexible conductors up to 2.5 mm ² Inputs/outputs: 2x 5-pin, RS485: 3-pin
Weight	75 g
Certifications	CE, FCC Part 15 Class B, IC

MRcard PLS (Cellular radio / serial)

Mobile communication	
Frequency bands (MRcard PLS)	4G/LTE*: 800, 900, 1.800, 2.100, 2.600 MHz; LTE Cat. 3 (DL: max. 100 Mbps, UL: max. 50 Mbps) 3G/UMTS/HSPA: 900, 1.800, 2.100 MHz; UMTS, HSPA+ (DL Cat. 24, UL Cat. 6) 2G/GPRS/EDGE: 900/1.800 MHz; GPRS/EDGE Class 12
Frequency bands (MRcard PLS-US)	4G/LTE: 700, 850, 1.700/2.100 (AWS), 1.900 MHz; LTE Cat. 3 (DL: max. 100 Mbps, UL: max. 50 Mbps) 3G/UMTS/HSPA: 850, 1700/2100 (AWS), 1.900 MHz; UMTS, HSPA+ (DL: Cat. 24, UL: Cat. 6) 2G/GPRS/EDGE: 850, 900, 1.800, 1.900 MHz; GPRS/EDGE Class 12
Antenna connection	2x SMA female (2G/3G/4G: Main, 3G: Rx Diversity, LTE: MIMO)
SIM	Slot for 1 Mini-SIM card (2FF), locked
Indications	Power, WAN (Internet connection), Signal (cellular radio), Info (configurable)
Serial interface	
RS232	1 x RS232 / D-Sub-9 (m)
Functions	Serial-Ethernet gateway (incoming and outgoing connections, Modbus TCP/RTU gateway, modem emulation, editable AT answer list, translation of phone numbers to IP addresses)
Inputs / Outputs	
Digital inputs	2 digital inputs, 1x contact input (active), 1x voltage-sensitive (passive, as per EN 61131-2, Type 1)
Digital outputs	1 open collector output
Supply / environmental conditions	
Voltage	Supplied via MRX, 2 further supply connections optional (redundancy) 12 ... 24 V DC (± 20%)
Power consumption	Typ. 2.5 W, max. 5 W
Operating temperature	-30 ... +75 °C ³
Weight	95 g
Certifications	CE (MRcard PLS), FCC part 15 class B, IC (MRcard PLS-US)

³ Range +70...+75 °C: under extended conditions (refer to: www.insys-icom.com/extended)

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MRcards

Technical Data

MRcard IO

Inputs / Outputs	
Analogue inputs	3x on push-in terminal (3-pin), measuring range individually selectable: voltage 0 ... 10 V / current 0 / 4 ... 20 mA, accuracy: $\pm 0.3\%$ to range value ± 100 ppm/K, isolated, also between the inputs
Analogue outputs	1x on push-in terminal (2-pin), mode selectable: voltage 0 ... 10 V / current 0 / 4 ... 20 mA, accuracy: $\pm 0.3\%$ to range ± 100 ppm/K, resolution 12 bits
Digital inputs	4x on push-in terminal (5-pin), can be switched together: contact input (active) or voltage-sensitive (passive, level as per EN 61131, Type 1), galvanic isolation
Digital outputs	4x on push-in terminal (5-pin), relay normally open, load capacity max. 3 A per output, altogether max. 5 A
Indications	4x LEDs change of digital inputs, states of analogue inputs, change of digital outputs
Supply / environmental conditions	
Voltage	Supplied via MRX
Power consumption	typ./max. 1.5 W
Operating temperature	-30 ... +70 °C
Weight	95 g
Certifications (planned)	CE, FCC part 15 class B, IC

MRcard Fiber

SFP ports	
SFP ports	2x SFP cages for SFP transceiver modules as per SFP-MSA, 1000BASE-X, 100BASE-X
Indications	Power, WAN (internet connection), SFP1, SFP2 (SFP status and activity)
Inputs	
Inputs	2 digital inputs for configurable actions, 1x low-active, 1x high-active (as per EN 61131-2, Type 1)
Supply / environmental conditions	
Voltage	Supplied via MRX, 2 further supply connections optional (redundancy) 12 ... 24 V DC ($\pm 20\%$)
Power consumption	typ./max. 4W (thereof 3 W MRcard Fiber + approx. 0.5W for each SFP module)
Operating temperature	-30 ... +65 °C, in combination with MRX DSL or MRcard PD: -30 ... +55 °C
Weight	85 g
Certifications (planned)	CE, FCC part 15 class B, IC

MRcard WLAN

WIFI	
Standards	IEEE 802.11 b/g/n/ac
Frequency ranges, transmission power	2.4 GHz and 5 GHz, max. 100 mW
WLAN (Wi-Fi) modes	WLAN (Wi-Fi) Station (Client), WLAN Access Point with up to 10 stations simultaneously
Security	WPA/WPA2 (AES, TKIP), 802.1x (EAP: TLS, TTLS, PEAP)
Antenna connection	1x reverse SMA male
Supply / environmental conditions	
Voltage	Supplied via MRX
Power consumption	tbd
Operating temperature	-30 ... +65 °C, in combination with MRX DSL or MRcard PD: -30 ... +55 °C
Weight	55 g
Certifications (planned)	CE, if applicable FCC

MRX | MRcards

Order Numbers and Accessories

Available MRX Variants

Product description	Features	Order number
MRX3 LAN	Modular LAN-to-LAN router, 5 Ethernet ports, 2 inputs, 1 free MRcard slot	10016582
MRX5 LAN	Modular LAN-to-LAN router, 5 Ethernet ports, 2 inputs, 3 free MRcard slots	10017036
MRX3 LTE	Modular 4G mobile router, Cellular radio (LTE/HSPA/UMTS/EDGE/GPRS), 5 Ethernet ports, 2 inputs, 1 free MRcard slot	10016583
MRX5 LTE	Modular 4G mobile router, Cellular radio (LTE/HSPA/UMTS/EDGE/GPRS), 5 Ethernet ports, 2 inputs, 3 free MRcard slots	10017037
MRX3 DSL	Modular VDSL/ADSL router, VDSL2, ADSL/2/2+, 2 inputs, 5 Ethernet ports, 1 free MRcard slot	Annex A: 10019436 Annex J/B: 10019437
MRX5 DSL	Modular VDSL/ADSL router, VDSL2, ADSL/2/2+, 2 inputs, 5 Ethernet ports, 3 free MRcard slots	Annex A: 10019786 Annex J/B: 10019787

Available Cards

Product description	Features	Order number
MRcard PL	Cellular radio (LTE/HSPA/UMTS/EDGE/GPRS), 2 digital inputs	10017035
MRcard ES	4-port switch (10/100 Mbit)	10016584
MRcard PD	VDSL2, ADSL/2/2+, 2 digital inputs	Annex A: 10019434 Annex J/B: 10019435
MRcard SI	RS232, RS485, USB 2.0, 2 digital inputs, 2 switch outputs	10016585
MRcard PLS	cellular radio (LTE/HSPA/UMTS/EDGE/GPRS), RS232, 2 digital inputs, 1 digital output	10022163
MRcard PLS-US	cellular radio (LTE/HSPA/UMTS/EDGE/GPRS, US-frequencies, RS232, 2 digital inputs, 1 digital output	10022164
MRcard IO	3 analog inputs, 1 analog outputs, 4 digital inputs, 4 digital outputs (relay)	10022272
MRcard Fiber (Prototype)	2 SFP ports	10022271
MRcard WLAN (Prototype)	WLAN (Wi-Fi) Access Point or Station (Client), 2.4 GHz and 5 GHz	10022273

Suitable accessories

Product description	Description	Order number/Information
Magnetic Antenna 4G/3G/2G SMA	Height 72 mm, 3 m cable, SMA (m), protection class IP65	10019504
Outdoor Wall Antenna 4G/3G/2G SMA	Height 22 cm, mounting angle, 5m cable, SMA (m), protection class IP65	10020596
Roof Mount Antenna 4G/3G/2G SMA	Height 15,7 mm, length / width 80 x 76 mm, 3 m cable, SMA (m), protection class IP67	10022309
Magnetic/screw/adhesive Antenna 4G/3G/2G SMA	Height 38 mm, 5m cable, SMA (m)	10017462
Panel Antenna 4G/3G/2G MIMO SMA	MIMO antenna, height 8.4 cm, width 18.4 cm, 2x 2 m cable, SMA (m), protection class IP67	10020565
Antenna Extension Cable 5 m SMA	Device connector: SMA (f), antenna connection: SMA (m)	10015193
Antenna Extension Cable 10 m SMA	Device connector: SMA (f), antenna connection: SMA (m)	10018607
Antenna Extension Cable 15 m SMA	Device connector: SMA (f), antenna connection: SMA (m)	10000735
icom Connectivity Suite – VPN	VPN Service for M2M Applications	insys-icom.com/iCS/VPN
icom Connectivity Suite – M2M SIM	Industrial SIM cards, multi-roaming, pooling, management portal	insys-icom.com/iCS/SIM
icom OAM	Central management of device updates	insys-icom.com/en/OAM

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