

# MRX

## Modular Industrial Router

# Flexible. Powerful. Future-proof.



### M2M Communication Technology that adjusts to your needs

Changing demands requires flexible solutions. Modularity is the answer to this challenge. The new MRX industrial router series provides you with the necessary scope for developing future- and investment-proof applications and adjust them if required. This results in an optimum cost/performance ratio and extended service life.

Like all routers of INSYS icom, this fully-modular platform is characterised by very high system stability, longevity and consistent user guidance. VPN, a stateful firewall and further IT security features are integrated. An integrated Linux programming environment: based on LXC technology allows execute programs and scripts on an MRX in the so-called icom SmartBox (edge computing).

The new MRX series is available in three basic variants, LAN, LTE and DSL, each in two housing widths. It can be tailored to the application using various plug-in cards (MRcards) that can also be developed customer-specific.

### 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



MRcard **ES**

- 4-port switch (10/100 MBit)



MRcard **PL**

- LTE
- UMTS/HSPA
- GPRS/EDGE
- 2 digital inputs



MRcard **PD**

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



MRcard **SI**

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

# MRX (Basic Variants)

## Technical Data

<b>Mobile communication</b> (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
<b>Wire-bound VDSL/ADSL communication</b> (only MRX DSL)	
DSL standards	MRX DSL-A (Annex A): <ul style="list-style-type: none"> <li>■ VDSL2 G.993.2 Profile 8a, 8b, 8c, 8d, 12a, 12b, 17a, 30a, VDSL2 Vectoring G.993.5</li> <li>■ ADSL/ADSL2/ADSL2+ G.992.1 Annex A, G.992.3. Annex A/L/M, G.992.5 Annex A and M, T1.413</li> </ul> MRX DSL-B (Annex B): <ul style="list-style-type: none"> <li>■ VDSL2 G.993.2 Profile 8a, 8b, 8c, 8d, 12a, 12b, 17a, 30a, VDSL2 Vectoring G.993.5</li> <li>■ ADSL/ADSL2/ADSL2+ G.992.1 Annex B, G.992.3. Annex B, G.992.5 Annex B and J</li> </ul>
DSL connection	RJ45 connector
<b>Router</b>	
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, RIPng; 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")
<b>Ethernet switch, interfaces</b>	
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
<b>Operation</b>	
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) / MRcards

## 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 ( $\pm 20\%$ ), 2 supply connections with changeover detection	
Terminals	5-pin push-in terminal connectors (maintenance free), rigid/flexible conductors up to 2.5 mm <sup>1</sup>	
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 <sup>1</sup>	
Operating temperature MRX DSL	-25...+60 °C <sup>2</sup>	
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	

## MRcard PL (LTE)

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
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), Signal (cellular radio), Info (configurable)
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 <sup>1</sup>
Certifications	CE

<sup>1</sup> Range +70...+75 °C: under restricted conditions (refer to: [www.insys-icom.com/restricted](http://www.insys-icom.com/restricted))

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

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

# MRcards

## Order Numbers, Accessories

### MRcard PD (VDSL/ADSL)

Wire-bound VDSL/ADSL communication	
DSL standards	MRcard PD-A (Annex A): <ul style="list-style-type: none"> <li>■ VDSL2 G.993.2 Profile 8a, 8b, 8c, 8d, 12a, 12b, 17a, 30a, VDSL2 Vectoring G.993.5</li> <li>■ ADSL/ADSL2/ADSL2+ G.992.1 Annex A, G.992.3. Annex A/L/M, G.992.5 Annex A and M, T1.413</li> </ul> MRcard PD-B (Annex B): <ul style="list-style-type: none"> <li>■ VDSL2 G.993.2 Profile 8a, 8b, 8c, 8d, 12a, 12b, 17a, 30a, VDSL2 Vectoring G.993.5</li> <li>■ ADSL/ADSL2/ADSL2+ G.992.1 Annex B, G.992.3. Annex B, G.992.5 Annex B and J</li> </ul>
Function	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 (± 20%)
Power consumption	approx. 5.0 W
Operating temperature	-25°C...+60°C <sup>3</sup>
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 loss detection
Supply / environmental conditions	
Voltage	Supplied via MRX
Power consumption	typical approx. 1.0 W, max. 1.5 W
Operating temperature	-30...+75 °C
Certifications	CE, FCC Part 15 Class B, IC

### 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 <sup>2</sup> Inputs/outputs: 2x 5-pin, RS485: 3-pin
Certifications	CE, FCC Part 15 Class B, IC

<sup>3</sup> Ranges -25 ... 0°C and 55°C ... 60°C under restricted conditions (refer to: [www.insys-icom.com/restricted](http://www.insys-icom.com/restricted))  
Note: range 55°C ... 60°C only when installed in MRX LAN and without further MRcards PD or PL

## MRX

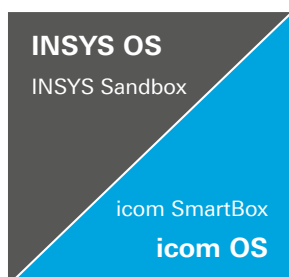
### Order Numbers and Accessories

#### Available 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
MRcard PL	Cellular radio (LTE/HSPA/UMTS/EDGE/GRPS), 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

#### 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
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 2m 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
Power supply 24V	TDK Lambda DSP 10-24 AC/DC power supply unit for DIN rail	10014249
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 devices, configurations, certificates and update packages	insys-icom.com/en/OAM



#### Migration from INSYS OS to icom OS: We would be glad to support you!

You are still using routers of the series MoRoS, EBW or IMON with INSYS OS operating system?

We stand by you with words and deeds for a migration to the MRX with our icom OS operating system: Request the detailed white paper, visit our trainings or use our services, whether for configuration adaptation or migration from Linux applications to the icom SmartBox.

Further information: [www.insys-icom.com/knowledge/os-migration](http://www.insys-icom.com/knowledge/os-migration)

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