INSYS icom

MRX2 / MRX3 / MRX5

Modular industrial router

Flexible. High-performance. Future-proof.

SecurITy
made in EU
Trust Seal
www.teletrust.de/itsmie
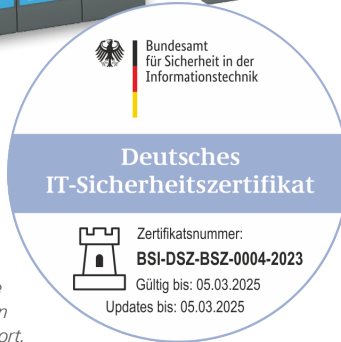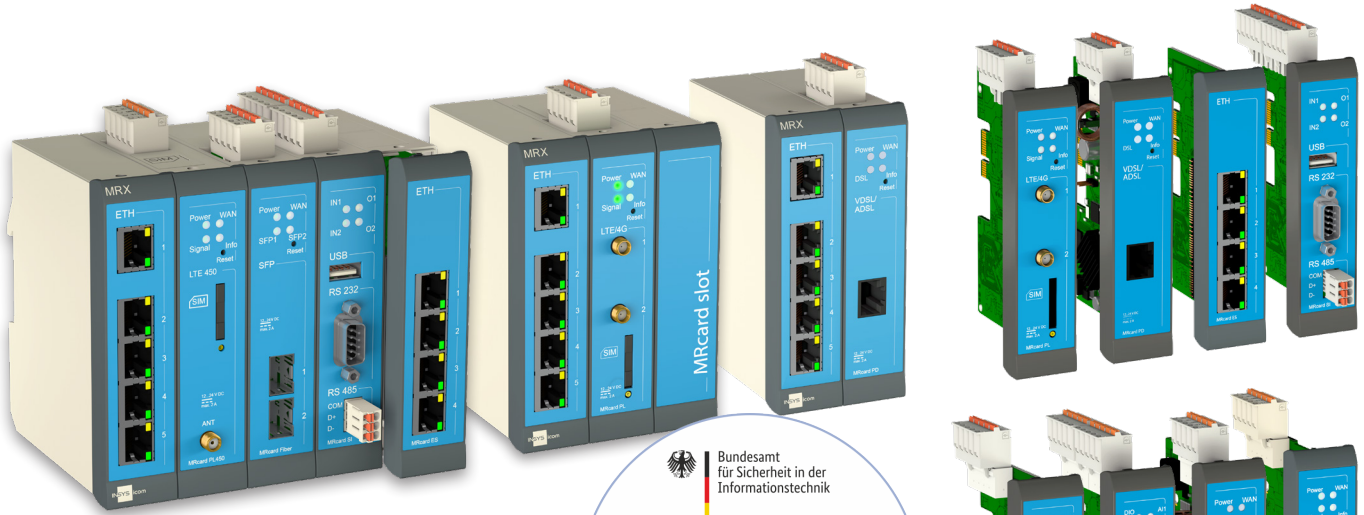
Applies in compliance with the described Secure Configuration Guide and the certification report.

Bundesamt für Sicherheit in der Informationstechnik

Deutsches IT-Sicherheitszertifikat

Zertifikatsnummer:
BSI-DSZ-BSZ-0004-2023
Gültig bis: 05.03.2025
Updates bis: 05.03.2025

MRX - the flexible power

Powerful and versatile for individual solutions

The modularity of the MRX routers makes it possible to put together a customised router for each individual application. With extensive routing functionality and high IT security, the MRX is well suited for remote access to critical infrastructures and machinery. Thanks to the plug & play connection to cloud services and applications, remote access and monitoring can be implemented quickly and easily.

Flexibility of design
Modular design enables customised routers for different scenarios

Easy remote access & device updates
Plug & play - connection of VPN service and central device management

Flexible expandability
Simple and future-proof addition of interfaces with plug-in cards (MRcards)

Extensive routing functions
Multiple local IP networks, RSTP and connection with parallel VPN

Universal WAN technologies
Internet access via 4G/DSL/LAN and fibre optics, can also be combined as a failover

High security levels
Hardened operating system, extensive monitoring and security functions

Many application interfaces
Up to 17 Ethernet ports; serial interfaces; digital and analogue I/Os

IoT-ready
Local data processing as well as connection to IoT platforms and cloud systems

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MRX (Basic Variants)

Technical Data

Cellular communication	(MRX LTE and MRX LTES)	
Frequency bands MRX LTE from vers. 1.2 and MRX2 LTES from vers. 1.1 or higher (worldwide variant)	4G/LTE:	1 (2100 MHz), 2 (1900 MHz), 3 (1800 MHz), 4 (2100/1700 MHz, AWS), 5 (850 MHz), 7 (2600 MHz), 8 (900 MHz), 12 (700 MHz), 13 (700 MHz), 14 (700 MHz), 18 (850 MHz), 19 (850 MHz), 20 (800 MHz), 25 (1900 MHz), 26 (850 MHz), 28 (700 MHz), 38 (2600 MHz), 40 (2300 MHz), 41 (2500 MHz), 66 (2100 MHz), 71 (600 MHz)
		LTE Cat 4 (DL: 150 Mbit/s, UL: 50 Mbit/s)
	3G/UMTS/HSPA:	1 (2100 MHz), 2 (1900 MHz), 3 (1800 MHz), 4 (2100/1700 MHz AWS), 5 (850 MHz), 6 (800 MHz), 8 (900 MHz), 19 (850 MHz)
		HSPA+, HSUPA (DL: max. 21 Mbit/s, UL: max. 5.7 Mbit/s)
	2G/GPRS/EDGE:	850, 900, 1800, 1900 MHz; GPRS/EDGE class 12 (DL/UL: max. 237 kbit/s)
Frequency bands MRX LTE up to vers. 1.1 and MRX2 LTES 1.0 (EMEA versions) [1]	4G/LTE:	1 (2100 MHz), 3 (1800 MHz), 7 (2600 MHz), 8 (900 MHz), 20 (800 MHz)
		LTE Cat 3 (DL: 100 Mbit/s, UL: 50 Mbit/s)
	3G/UMTS/HSPA:	1 (2100 MHz), 3 (1800 MHz), 8 (900 MHz)
		HSPA+, HSUPA (DL: max. 42 Mbit/s, UL: max. 5.7 Mbit/s)
	2G/GPRS/EDGE:	900, 1800 MHz; GPRS/EDGE class 12 (DL/UL: max. 237 kbit/s)
Frequency bands MRX2 LTES-US 1.0 (USA/Canada variant)	4G/LTE:	2 (1900 MHz), 4 (2100/1700 MHz AWS), 5 (850 MHz), 13 (700 MHz), 17 (700 MHz); LTE Cat 3 (DL: max.100 Mbit/s, UL: max. 50 Mbit/s)
	3G/UMTS/HSPA:	2 (1900 MHz), 4 (2100/1700 MHz AWS), 5 (850 MHz) ; UMTS, HSPA+
		HSPA+, HSUPA (DL: max. 42 Mbit/s, UL: max. 5.7 Mbit/s)
	2G/GPRS/EDGE:	850, 900, 1800, 1900 MHz; GPRS/EDGE Class 12 (DL/UL: max. 237 kbit/s)
Antenna connection	2x SMA female (Main antenna, optional external antenna MIMO)	
SIM	Slot for 1 Mini-SIM card (2FF), locked	
	Provider redundancy with multi-roaming SIM cards (see section "Suitable accessories")	
Dual APN	Splitting of cellular data traffic over 2 APNs (with 2 SIM cards), e.g. separation of user and management data	
Cellular status	Signal field strength, RSSI, RSCP / Ec/No, RSRP / RSRQ, cell ID, location ID	
Cellular communication incl. LTE450	(MRX LTE450)	
Frequency bands MRX LTE 450 1.0	4G/LTE:	1 (2100 MHz), 3 (1800 MHz), 5 (850 MHz), 7 (2600 MHz), 8 (900 MHz), 20 (800 MHz), 28 (700 MHz), 31 (450 MHz), 72 (450 MHz); LTE Cat 1 (DL: 10 Mbit/s, UL: 5 Mbit/s)
	2G/GPRS/EDGE:	900, 1800 MHz; GPRS/EDGE class 12 (DL/UL: max. 237 kbit/s)
Antenna connection	SMA female	
SIM	2x SIM: 2 slots for Mini-SIM cards (2FF), locked; automatic failover;	
	Further provider redundancy with multi-roaming SIM cards (see section "appropriate accessories")	
Dual APN	Splitting of cellular data traffic over 2 APNs (with 2 SIM cards) , e.g. separation of user and management data	
Cellular status	Signal field strength, RSSI, RSCP / Ec/No, RSRP / RSRQ, cell ID, location ID	
VDSL/ADSL	(MRX DSL)	
DSL standards	MRX DSL-A (Annex A):	
	- VDSL2 G.993.2 Profile 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):	
	- 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	
SFP / Fiberglass	(MRX Fiber)	
SFP-Ports	2x SFP cages for fibre optic transceiver modules according to SFP-MSA, 1000BASE-X, 100BASE-X	
Hardware interfaces		
Ethernet ports	5 x RJ45 shielded, 10/100 Mbit/s, Full/half duplex, Auto MDI-X, 1.5 kV isolation voltage	
Ethernet function	Assignment to IP network freely configurable per port, link up/down detection, configuration port	
Inputs	2 digital inputs (available in all basic variants), status can be monitored:	
	1x low active (connection to GND) 1x high active (connection to 10...24 V DC, as per EN 61131-2, type 1)	
Displays (LEDs)	Power, WAN (Internet connection), Info (configurable), Signal (for cellular communication), DSL (for DSL)	

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MRX (Basic Variants)

Technical Data

	SFP1 / SFP2 (SFP status and activity, for MRX Fiber)
Further interfaces	Optional addition of MRcards (modular design)
Further hardware interfaces MRX2 LTES	
RS232	1 x RS232 / D-Sub-9 (m)
Functions	Serial Ethernet gateway (incoming and outgoing connections, Modbus TCP/RTU gateway,
Serial interface	modem emulation, editable AT answer list, translation of phone numbers to IP addresses)
Digital Outputs	1 open collector output
Network	
Network functions	5 local IP networks, IP static/DHCP, TCP, UDP, IPv4, IPv6, NTP, DHCP, DNS, HTTP/S, ARP, SSH,
	802.1Q VLAN incl. tags and trunk ports
Service	DHCP Server v4/v6 per IP network, DHCP relay, NTP server, DNS, DynDNS, IPv6 Router Advertiser
Routing	Static routing, routing priority, RSTP, dynamic routing (OSPF, BGP, RIPv1, RIPv2, RIPng)
WAN	Several WAN connections configurable also in parallel operation, fallback level for connection
redundancy/failover	breakdown (failover), event-based WAN changeover (see events)
Connection check	Periodic, ping/icmp, DNS request, link up/down
DSL	PPPoA and PPPoE (MRX3/5 DSL und MRcard PD-A/B); external DSL modems: PPPoE
NAT/PAT	SNAT/DNAT (masquerade, netmapping, port forwarding, IP forwarding) unlimited number of rules
VPN	
icom Connectivity Suite	Supports VPN service for remote maintenance, remote access and M2M-communication
OpenVPN	Client/server, several parallel tunnels, server with up to 20 clients, tls-auth/tls-crypt, dead peer detection (DPD)
OpenVPN encryption	Blowfish 128 Bit, DESX 192 Bit, DES 64 Bit, DES EDE 128 Bit, DES EDE3 192 Bit, AES 128-256 Bit,
	RC2 40-128 Bit, IDEA 128, CAST5 128 Bit, SHA1, SHA 224-512
IPsec	IKEv1, IKEv2 (automatic, fix), several parallel tunnels, pre-shared keys, certificates,
	tunnel mode, transport mode, dead peer detection (DPD)
IPsec encryption	DES EDE3 192 Bit, AES 128-256 CBC/GCM, SHA1, MD5, SHA 256-512,
	DH-Group 1-31 (Diffie-Hellman 768 - 25519), ChaCha20-Poly1305
GRE	GRE via IPsec, point-to-point, multipoint
PPTP	PPTP client/server; PAP/CHAP/MS CHAP/MS CHAP V2; MPPE 40-128
Dynamic VPN	Dynamic multipoint VPN (GRE, IPsec, NHRP, OSPF, RIPv1/v2, BGP)
IT security	
Authentication	Pre-shared key, X.509 certificates, RADIUS, access rights (read, write, status)
Firewall / netfilter	IP filters (stateful firewall) also in VPN tunnel; packet filter: TCP, UDP, ICMP, ESP, AP, GRE;
	MAC filter; pre-defined firewall rules can be activated
Security	Booting signed firmware, HTTP/HTTPS attack prevention; response upon events:
	configuration change, link up/down, restart, login attempt, netfilter violation, password hashing
IoT and Cloud (icom Data Suite, license required)	
Function	Machine connection and data processing; connection to cloud and SCADA Systems;
icom Data Suite	arithmetic & logic functions; data logger; dashboard
Data acquisition	CODESYS, Modbus TCP/RTU, MQTT, Siemens S7, OPC UA Client, IEC 60870-5-101,
	digital input, analogue input (if present)
Data transmission	MQTT, OPC UA Server, IEC 60870-5-104, Modbus TCP/RTU, e-mail, SMS, SFTP,
	digital input, analogue input (if present)
IoT platforms	MQTT compatibility: Thingsboard, Cumulocity, AnyViz, Azure IoT Hub, Bosch IoT Suite, AWS IoT Core
Events & Actions	
Event & Action Handler	Notification, alarming, diagnosis, attack detection, fault handling, operation and commissioning logic
Events / alarms	Change: digital input, Ethernet port, WAN chain, profile status, supply input (with MRX), cellular field strength;
(selection)	timer expired, firewall violation, login attempt detection, pulse sequence on digital input, counter, netfilter rule
Event-triggered	Messages via e-mail, SMS (only LTE variants), SNMP traps, MCIP; switch profile,
actions (selection)	switch connection, change modem state, start timer, switch output or pulse sequence,
	activate firmware, reset, restart container

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MRX (Basic Variants)

Technical Data

Programming environment/scripting	
Container environment	Installation of several application containers, container with own IP end point, assignment to IP networks - full firewall and routing transparency; access control, SDK available
Container Resources	CPU: 50% of ARMv7 (720 MHz), RAM: 448 MB, Flash: 3 GB eMMC
Lua scripting	Lua interpreter for own scripts
Monitoring and Management	
Monitoring	SNMP traps and agent, configurable system logs, remote syslog, link up/down detection, netfilter violation
Certificate management	EST, CRL
icom Router Management	Supports central router management for FW updates, configuration management, connection monitoring, container updates, mass rollout, certificate management, available as public/private cloud (server) installation or onPremises
Administration	
Configuration	Web Interface HTTP(S) with session management, command line interface (CLI), Telnet, SSH, configuration profiles as ASCII and binary file, ample configuration profiles event-triggered, REST API
Diagnosis tools	Ping/icmp, tcpdump, traceroute, DNS lookup, AT commands, port mirroring
FW update	Incremental, failsafe, update server (HTTP, FTP, HTTPS, FTPS), icom Router Management (WebSocket)
System time	NTP client and server, buffered real time clock
Help	Web interface: inline help, online help; example profiles, plausibility check, Configuration Guides
Supply	
Voltage	12 ... 24 V DC (±20 %), 2 supply connections with changeover detection, reverse-polarity protected
Terminals	5-pin push-in terminal connectors (maintenance free), rigid/flexible conductors up to 2.5 mm²
Power consumption (basic variants without further MRcards; value depends on data throughput amongst others)	MRX LAN: typical approx. 2.0 W, max. 3.5 W MRX DSL: typical approx. 6.5 W, max. 8.0 W MRX LTE/LTES/LTE450: typical approx. 2.5 W, max. 8.0 W MRX Fiber: typical approx. 5.5 W, max 7,0 W (thereof typically approx. 4.5 W MRX Fiber + assumption approx. 0.5 W typically per SFP module)
Ambient conditions	
Dimensions	MRX2: 54 x 117 x 88 mm (W x D x H) MRX3: 82 x 117 x 88 mm (W x D x H) MRX5: 136 x 117 x 88 mm (W x D x H)
Weight	MRX2 LAN: 255 g MRX2 LTE/LTE450/Fiber: 270 g MRX2 DSL/LTES: 280 g MRX3 LAN: 305 g MRX3 LTE/LTE450/Fiber: 320 g MRX3 DSL: 330 g MRX5 LAN: 395 g MRX5 LTE/LTE450/Fiber: 410 g MRX5 DSL: 420g
Mounting	DIN rail mounting, Horizontal pitch (HP) on DIN rail : 3 HP (MRX2), 5 HP (MRX3), 8 HP (MRX5)
Operating temperature	-30 … +75 °C [2] MRX LAN, MRX LTE, MRX LTES, MRX LTE450 -25 … +60 °C [3] MRX DSL -25 … 55 °C [4] MRX DSL in combination with MRcard PD/PL/PL450/PLS/Fiber -30 … +65 °C MRX Fiber -30 … 55 °C [5] MRX Fiber in combination with MRcard PD/PL/PL450/PLS/Fiber
Humidity	0 … 95 % (non-condensing)
IP rating	Housing: IP40

MRX (Basic Variants)

Technical Data

Approvals & Standards	
Certifications	All variants: CE, UKCA
	Additionally for MRX LAN 1.x, MRX Fiber 1.x MRX2 LTES from 1.1 and MRX LTE from 1.2: FCC part 15 class B, IC
	Additionally for MRX2 LTES-US: FCC part 15 class B, IC, UL 62368-1
EMC	Emission: EN 55032 Class B, EN 61000-6-3; immunity: EN 55035 (replaces EN 55024), EN 61000-6-2
Safety	IEC/EN 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 60068-2-30
Operating time	MTBF > 880,000 h (25 °C), according to SN 29500 standard (according to IEC 61709)

MRcards

Modular plug-in cards for MRX series routers
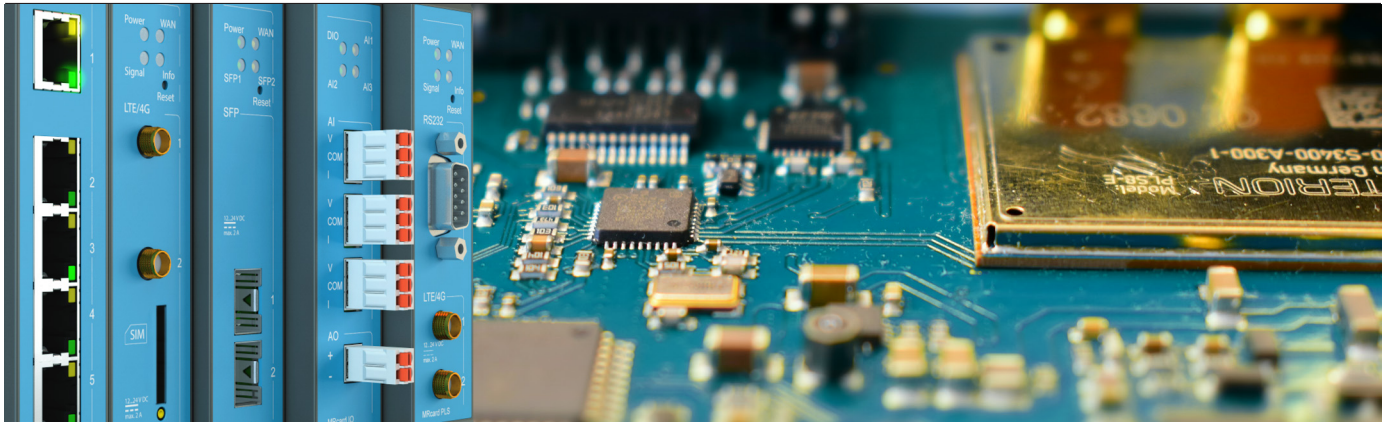
Individual functionality
Combine MRcards with different functions, exactly fitting for your application!

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 communication
- 2 digital inputs

MRcard **PD**

- VDSL2
- ADSL/2/2+
- 2 digital inputs
- 2 variants (-A, -B)
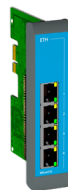
MRcard **ES**

- 4-port switch (10/100 MBit)

MRcard **SI**

- RS232
- RS485
- 2 digital inputs
- 2 relay outputs

MRcard **PLS**

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

MRcard **IO**

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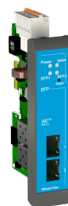

MRcard **Fiber**

- 2x Gigabit SFP
- 2 digital inputs

MRcard **PL450**

- Mobile communication incl. LTE450
- Dual SIM
- 2 digital inputs

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MRcards
Technical Data

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MRcard PL (cellular communication)

Cellular communication		
Frequency bands MRcard PL 1.1 (worldwide version)	4G/LTE:	1 (2100 MHz), 2 (1900 MHz), 3 (1800 MHz), 4 (2100/1700 MHz, AWS), 5 (850 MHz), 7 (2600 MHz), 8 (900 MHz), 12 (700 MHz), 13 (700 MHz), 14 (700 MHz), 18 (850 MHz), 19 (850 MHz), 20 (800 MHz), 25 (1900 MHz), 26 (850 MHz), 28 (700 MHz), 38 (2600 MHz), 40 (2300 MHz), 41 (2500 MHz), 66 (2100 MHz), 71 (600 MHz)
		LTE Cat 4 (DL: 150 Mbit/s, UL: 50 Mbit/s)
	3G/UMTS/HSPA:	1 (2100 MHz), 2 (1900 MHz), 3 (1800 MHz), 4 (2100/1700 MHz AWS), 5 (850 MHz), 6 (800 MHz), 8 (900 MHz), 19 (850 MHz)
		HSPA+, HSUPA (DL: max. 21 Mbit/s, UL: max. 5.7 Mbit/s)
	2G/GPRS/EDGE:	850, 900, 1800, 1900 MHz; GPRS/EDGE class 12 (DL/UL: max. 237 kbit/s)
Frequency bands MRcard PL 1.0 (EMEA version)[1]	4G/LTE:	1 (2100 MHz), 3 (1800 MHz), 7 (2600 MHz), 8 (900 MHz), 20 (800 MHz)
		LTE Cat 3 (DL: 100 Mbit/s, UL: 50 Mbit/s)
	3G/UMTS/HSPA:	1 (2100 MHz), 3 (1800 MHz), 8 (900 MHz)
		HSPA+, HSUPA (DL: max. 42 Mbit/s, UL: max. 5.7 Mbit/s)
	2G/GPRS/EDGE:	900, 1800 MHz; GPRS/EDGE class 12 (DL/UL: max. 237 kbit/s)
Antenna connection	2x SMA female (Main antenna, optional external antenna MIMO)	
SIM	Slot for 1 Mini-SIM card (2FF), locked	
Indications (LEDs)	Power, WAN (Internet connection), Signal (cellular communication), 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 (redundancy) 12 ... 24 V DC (±20 %)	
Power consumption	Typical approx. 1.0 W, max. 5.0 W	
Operating temperature	-30 ... +75 °C [2] (maximum, possibly limited by MRX variant used)	
Weight	85 g	
Certifications	MRcard PL 1.0: CE, UKCA	
	MRcard PL 1.1: CE, UKCA, FCC part 15 class B, IC	

MRcard PD (VDSL/ADSL)

Wire-bound VDSL/ADSL communication	
DSL standards	MRcard PD-A (Annex A):
	- 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 und M, T1.413
	MRcard PD-B (Annex B):
	- VDSL2 G.993.2 Profile 8a, 8b, B13 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 und J
DSL connection	RJ45 socket
DSL Function	PPPoE, PPPoA
Indications (LEDs)	Power, WAN (Internet connection), Info (configurable), DSL
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 (redundancy) 12 ... 24 V DC (±20 %)
Power consumption	Approx. 5.0 W
Operating temperature	-25 ... +60 °C [3] (maximum, possibly limited by MRX variant used)
Weight	95 g
Certifications	CE, UKCA

MRcards

Technical Data

MRcard ES (Ethernet Switch)

Ethernet switch	
Ethernet ports	4 x RJ45, 10/100 Mbit/s, full/half duplex, Auto MDI-X, 1.5 kV isolation voltage
Ethernet 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 (maximum, possibly limited by MRX variant used)
Weight	70 g
Certifications	CE, UKCA, FCC part 15 Class B, IC

MRcard SI (serial / I/O)

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, as per EN 61131-2, type 1, push-in terminal connectors
Digital outputs	2x via terminals, potential-free change-over relay (2A at max. 30 V DC/42 V AC), 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 (maximum, possibly limited by MRX variant used)
Terminals	Push-in terminal connectors (maintenance free), rigid/flexible conductors up to 2.5 mm²
	Inputs/outputs: 2x 5-pin, RS485: 3-pin
Weight	75 g
Certifications	CE, UKCA, FCC part 15 class B, IC

MRcard PLS (cellular communication / serial / I/O)

Cellular communication		
Frequency bands MRcard PLS 1.1 (worldwide version)	4G/LTE:	1 (2100 MHz), 2 (1900 MHz), 3 (1800 MHz), 4 (2100/1700 MHz, AWS), 5 (850 MHz), 7 (2600 MHz), 8 (900 MHz), 12 (700 MHz), 13 (700 MHz), 14 (700 MHz), 18 (850 MHz), 19 (850 MHz), 20 (800 MHz), 25 (1900 MHz), 26 (850 MHz), 28 (700 MHz), 38 (2600 MHz), 40 (2300 MHz), 41 (2500 MHz), 66 (2100 MHz), 71 (600 MHz)
		LTE Cat 4 (DL: 150 Mbit/s, UL: 50 Mbit/s)
	3G/UMTS/HSPA:	1 (2100 MHz), 2 (1900 MHz), 3 (1800 MHz), 4 (2100/1700 MHz AWS), 5 (850 MHz), 6 (800 MHz), 8 (900 MHz), 19 (850 MHz)
		HSPA+, HSUPA (DL: max. 21 Mbit/s, UL: max. 5.7 Mbit/s)
	2G/GPRS/EDGE:	850, 900, 1800, 1900 MHz; GPRS/EDGE class 12 (DL/UL: max. 237 kbit/s)
Frequency bands MRcard PLS 1.0 (EMEA version)[1]	4G/LTE:	1 (2100 MHz), 3 (1800 MHz), 7 (2600 MHz), 8 (900 MHz), 20 (800 MHz)
		LTE Cat 3 (DL: 100 Mbit/s, UL: 50 Mbit/s)
	3G/UMTS/HSPA:	1 (2100 MHz), 3 (1800 MHz), 8 (900 MHz)
		HSPA+, HSUPA (DL: max. 42 Mbit/s, UL: max. 5.7 Mbit/s)
	2G/GPRS/EDGE:	900, 1800 MHz; GPRS/EDGE class 12 (DL/UL: max. 237 kbit/s)
Frequency bands MRcard PLS-US	4G/LTE:	2 (1900 MHz), 4 (2100/1700 MHz AWS), 5 (850 MHz), 13 (700 MHz), 17 (700 MHz);
		LTE Cat 3 (DL: max.100 Mbit/s, UL: max. 50 Mbit/s)

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MRcards

Technical Data

(North America)	3G/UMTS/HSPA:	2 (1900 MHz), 4 (2100/1700 MHz AWS), 5 (850 MHz) ; UMTS, HSPA+
		HSPA+, HSUPA (DL: max. 42 Mbit/s, UL: max. 5.7 Mbit/s)
	2G/GPRS/EDGE:	850, 900, 1800, 1900 MHz; GPRS/EDGE Class 12 (DL/UL: max. 237 kbit/s)
Antenna connection	2x SMA female (Main antenna, optional external antenna MIMO)	
SIM	Slot for 1 Mini-SIM card (2FF), locked	
Indications (LEDs)	Power, WAN (Internet connection), Signal (cellular communication), 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	
serial interfaces	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 (redundancy) 12 ... 24 V DC (±20%)	
Power consumption	Typ. 2,5 W, max. 5 W	
Operating temperature	-30 ... +75 °C ² (maximum, possibly limited by MRX variant used)	
Weight	95 g	
Certifications	MRcard PLS 1.0: CE, UKCA	
	MRcard PLS 1.1 and MRcard PLS-US 1.0: CE, UKCA, FCC part 15 class B, IC	

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: ± 0.3 % to range value ± 100 ppm/K,
	galvanic isolation, 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: ± 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,
	maximum switching voltage: 30 V (DC) / 42 V (AC)
Indications (LEDs)	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 (maximum, possibly limited by MRX variant used)
Weight	95 g
Certifications	CE, UKCA, FCC part 15 class B, IC

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MRcards

Technical Data

MRcard Fiber

SFP ports	
SFP-Ports	2x SFP cages for SFP transceiver modules as per SFP-MSA, 1000BASE-X, 100BASE-X
Indications (LEDs)	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 (redundancy) 12 ... 24 V DC (±20%)
Power consumption	Typ./max. 4 W (thereof 3 W MRcard Fiber + assumption approx. 0.5 W per SFP module, depends on modules used)
Operating temperature	-30 ... +65 °C (maximum, possibly limited by MRX variant used)
Weight	85 g
Certifications	CE, UKCA, FCC part 15 class B, IC

MRcard PL450 (cellular communication incl. LTE450)

Cellular communication		
Frequency bands	4G/LTE:	1 (2100 MHz), 3 (1800 MHz), 5 (850 MHz), 7 (2600 MHz), 8 (900 MHz), 20 (800 MHz), 28 (700 MHz), 31 (450 MHz), 72 (450 MHz)
		LTE Cat 1 (DL: 10 Mbit/s, UL: 5 Mbit/s)
	2G/GPRS/EDGE:	900, 1800 MHz; EDGE: max 236.8 kBit/s (DL/UL)
		GPRS: max 85.6 kBit/s (DL/UL)
Antenna connection	1x SMA female	
SIM	2 slots for 1 mini SIM card (2FF) each, locked; automatic failover	
Displays (LEDs)	Power, WAN (Internet connection), Signal (cellular communication), Info (configurable)	
Inputs		
Inputs	2 digital inputs for definable actions, 1x low-active, 1x high-active (according to EN 61131-2, type 1)	
Supply / environmental conditions		
Voltage	Supplied via MRX, 2 further supply connections (redundancy) 12 ... 24 V DC (±20 %)	
Power consumption	Typically approx. 1.0 W, max. 5.0 W	
Operating temperature	-30 ... +75 °C ² (maximum, possibly limited by MRX variant used)	
Weight	85 g	
Certifications	CE, UKCA	

[1] Please check the availability of the cellular communication 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.

[2] +70 … +75 °C: extended temperature range

[3] - 25 … 0 °C and +55 … +60 °C: extended temperature range

[4] - 25 … 0 °C

[5]   -30 …0 °C: extended temperature range

[6] +65 … +70 °C: extended temperature range

(refer to www.insys-icom.com/en/extended-temperature-range/)

MRX | MRcards

Order Numbers and Accessories

Available MRX Variants

Product description	Features	Art. no.
MRX2 LAN	Modular LAN-to-LAN router, 5 Ethernet ports, 2 digital inputs	10024451
MRX2 LTES 1.0	Modular 4G router, frequency bands for Europe/Middle East/Africa, amongst others, 5 Ethernet ports, 2 inputs, 1 output, 1x RS232	10019400
MRX2 LTES 1.1	4G router, worldwide frequency bands, 5 Ethernet ports, 2 inputs, 1 output, 1x RS232	10023602
MRX2 LTES-US 1.0	4G router, frequency bands for North America) 5 Ethernet ports, 2 inputs, 1 output, 1x RS232	10019403
MRX2 LTE450	Modular 4G router incl. LTE450 with 2x SIM, 5 Ethernet ports, 2 digital inputs	10024453
MRX2 DSL-B	Modular VDSL/ADSL router, VDSL2, ADSL/2/2+, Annex J/B, 5 Ethernet ports, 2 digital inputs	10024454
MRX2 Fiber	Modularer SFP-Router, 5 Ethernet ports, 2 digital inputs	10024455

Product description	Features	Art. no.
MRX3 LAN	Modular LAN-to-LAN router, 5 Ethernet ports, 2 digital inputs, 1 free MRcard slot	10016582
MRX3 LTE 1.1	Modular 4G router, frequency bands for Europe/Middle East/Africa, amongst others, 5 Ethernet ports, 2 digital inputs, 1 free MRcard slot	10016583
MRX3 LTE 1.2	Modular 4G router, worldwide frequency bands, 5 Ethernet ports, 2 inputs, 1 free MRcard slot	10023438
MRX3 LTE450	Modular 4G router incl. LTE450 with 2x SIM, 5 Ethernet ports, 2 digital inputs, 1 free MRcard slot	10024049
MRX3 DSL-A	Modular VDSL/ADSL router, VDSL2, ADSL/2/2+, Annex A, 5 Ethernet ports, 2 digital inputs, 1 free MRcard slot	10019436
MRX3 DSL-B	Modular VDSL/ADSL router, VDSL2, ADSL/2/2+, Annex J/B, 5 Ethernet ports, 2 digital inputs, 1 free MRcard slot	10019437
MRX3 Fiber	Modularer SFP-Router, 5 Ethernet ports, 2 digital inputs,1 free MRcard slot	10024456

Product description	Features	Art. no.
MRX5 LAN	Modular LAN-to-LAN router, 5 Ethernet ports, 2 digital inputs, 3 free MRcard slots	10017036
MRX5 LTE 1.1	Modular 4G router, frequency bands for Europe/Middle East/Africa, amongst others, 5 Ethernet ports, 2 digital inputs, 3 free MRcard slots	10017037
MRX5 LTE 1.2	Modular 4G router, worldwide frequency bands, 5 Ethernet ports, 2 inputs, 3 free MRcard slot	10023440
MRX5 LTE450	Modular 4G router incl. LTE450 with 2x SIM, 5 Ethernet ports, 2 digital inputs, 3 free MRcard slots	10024050
MRX5 DSL-A	Modular VDSL/ADSL router, VDSL2, ADSL/2/2+, Annex A, 5 Ethernet ports, 2 digital inputs, 3 free MRcard slots	10019786
MRX5 DSL-B	Modular VDSL/ADSL router, VDSL2, ADSL/2/2+, Annex J/B, 5 Ethernet ports, 2 digital inputs, 3 free MRcard slots	10019787
MRX5 Fiber	Modularer SFP-Router, 5 Ethernet ports, 2 digital inputs, 3 free MRcard slot	10024457

Available plug-in cards

Product description	Features	Art. no.
MRcard ES	4-port switch (10/100 Mbit)	10016584
MRcard PL 1.0	Cellular communication (4G/3G/2G, frequency bands for Europe/Middle East/Africa, amongst others), 2 digital inputs	10017035
MRcard PL 1.1	Cellular communication (4G/3G/2G, worldwide frequency bands), 2 digital inputs	10023227
MRcard PLS 1.0	Cellular communication (4G/3G/2G, frequency bands for Europe/Middle East/Africa, amongst others), RS232, 2 digital inputs, 1 digital output	10022163
MRcard PLS 1.1	Cellular communication (4G/3G/2G, worldwide frequency bands), 2 digital inputs, 1 digital output	10023601
MRcard PLS-US	Cellular communication (4G/3G/2G, US frequency bands), RS232, 2 digital inputs, 1 digital output	10022164
MRcard PL450	Cellular communication incl. LTE450 (LTE/EDGE/GPRS), 2x SIM, 2 digital inputs	10023900

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MRX | MRcards

Order Numbers and Accessories

MRcard PD-A	VDSL2, ADSL/2/2+, Annex A, 2 digital inputs	10019434
MRcard PD-B	VDSL2, ADSL/2/2+, Annex J/B, 2 digital inputs	10019435
MRcard Fiber	2 SFP-Ports	10022271
MRcard SI	RS232, RS485, USB 2.0, 2 digital inputs, 2 digital outputs (relay)	10016585
MRcard IO	3 analog inputs, 1 analog outputs, 4 digital inputs, 4 digital outputs (relay)	10022272

Suitable accessories

Product description	Description	Art. no.
Magnetic Antenna 4G/3G/2G SMA	Magnet mounting, height 72 mm, 3 m cable, SMA (m), ingres protection IP65	10019504
Outdoor Wall Antenna 4G/3G/2G SMA	Wall mounting incl. bracket, height 220 mm, 5 m cable, SMA (m), ingres protection IP67	10020596
Allround Antenna 5G/4G/3G/2G	Screw or wall mounting, incl. steel angle, height 82 mm, 5 m cable, SMA (m), ingres protection IP67	10022961
Roof mount antenna 4G/3G/2G SMA	Screw mounting, height 15 mm, 3 m cable, SMA (m), ingres protection IP67	10022309
Magnetic Antenna MIMO 5G/4G/3G/2G SMA	Dual antenna MIMO, magnetic mounting, height 61 mm, width 150 mm, 2x 5 m cable, SMA (m), ingres protection IP65	10022963
Outdoor Panel Antenna MIMO 5G/4G/3G/2G SMA	Dual antenna MIMO, wall- / pole- / desk mounting, height/width 155 mm, 2x 5 m cable, SMA (m), ingres protection IP65	10022962
Panel Antenna 4G/3G/2G MIMO SMA	Dual antenna MIMO, mounting with suction cups, height 84 mm, width 184 mm, 2x 2 m cable, SMA (m), ingres protection IP67	10020565
LTE450 Wall Antenna IP67 5m SMA	Wall mounting incl. bracket, height 220 mm, 5 m cable, SMA (m), ingres protection IP67	10024225
LTE450 Wall Antenna 5G/4G/3G/2G IP67 IK10 5m SMA	Wall or mast mounting incl. brackets, LTE450 and standard cellular, Height 255 mm, 5m cable, SMA (m), protection IP67 (ingres) & IK10 (vandalism)	10024263
LTE450 Screw Mount Antenna 5G/4G/3G/2G IP67 IK10 5m SMA	Screm mounting on metallic surfaces, LTE450 and standard cellular, Height 50 mm, heigth 50 mm, 5m cable, SMA (m), protection IP67 (ingres) & IK10 (vandalism)	10024278
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 15W	Power supply unit for DIN rail, wide-range input voltage AC and DC, protection against short circuit / overload / over voltage	10022848
Wall power supply 24V 25W international	Power supply AC/DC with mains plug, suitable for desktop use, wide input, voltage range, protection against short, circuit/overload/over voltage	10022849
icom Connectivity Suite - VPN	Supports VPN service for remote maintenance, remote access and M2M communication www.insys-icom.com/en/products/managed-services/vpn-service/	various
icom Connectivity Suite - M2M SIM	Industrial SIM cards, multi-roaming, pooling, management portal www.insys-icom.com/en/products/managed-services/m2m-sim-service/	various
icom Router Management	Supports central router management for FW updates, configuration management, connection monitoring, container updates, mass rollout, certificate management; Available as public/private cloud (server) installation or onPremises www.insys-icom.com/en/products/managed-services/device-management/	various

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