# MOROS.neo

## VPN-Router / IoT-Gateways

# MOROS.neo – The DIN rail standard router for industry and control cabinets. Durable. Secure. Reliable.

## Reliable remote maintenance and network segmentation – complemented by INSYS-icom Services for VPN, SIM, and device management

MOROS.neo stands for highly reliable Internet connectivity as a router, industrial firewall, and machine gateway – for industrial and critical infrastructure applications

### WiFi: Client + Access Point
WiFi service access; client and access point mode; deliberately activatable service window on the device

### 4G Cellular with Dual SIM
Cellular connectivity for flexible WAN access; dual Nano-SIM for higher availability; options for separating operations and service

### RS-485/Modbus & I/Os
RS-485/Modbus connectivity for existing installations; digital inputs/outputs for signals and actions; integration without additional hardware

### Hardened Router OS
Security, firewall, and network functions; protection against tampering during system startup through Secure Boot

### Gigabit & VLAN
4× Gigabit Ethernet; VLAN and segmentation options; managed switching for clean network separation

### EDGE Apps on the Device
EDGE apps via LXC containers; local data processing; extensibility for protocol gateways, data logging, and IoT/cloud connectivity

### Remote Maintenance & VPN Protocols
Worldwide remote maintenance; OpenVPN, WireGuard, IPsec; plug-and-play with INSYS-icom Services

### Quick Start & Open Interfaces
Quick-start wizard; personal support for initial commissioning and project implementation; REST-API for integration and automation

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## VPN-Router / IoT-Gateways

| | | |
|---|---|---|
| **Cellular communication 4G** (MOROS.neo-E.4G / -EW.4G) | | |
| Frequency bands, data rates | 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 (700MHz), 18 (850 MHz), 19 (850 MHz), 20 (800 MHz), 25 (1900MHz), 26 (850 MHz), 28 (700 MHz), 38 (2600 MHz), 39 (1900MHz), 40 (2300 MHz), 41 (2500 MHz), 66 (2100 MHz), 71 (600MHz)<br>LTE Cat 4 (DL: max. 150 Mbit/s, UL: max. 50 Mbit/s) |
| | 3G/UMTS/HSPA: | 1 (2100 MHz), 2 (1900 MHz), 4 (2100/1700 MHz AWS), 5 (850 MHz), 6 (800 MHz), 8 (900 MHz), 19 (850 MHz)<br>DC-HSPA+, HSUPA (DL: max. 42 Mbit/s, UL: max. 5,76 Mbit/s) |
| Antenna connection | 2x SMA female (main antenna & optional additional antenna, MIMO) | |
| SIM | 1 tray for 2 Nano-SIM cards (4FF), dual SIM single standby (DSSS)<br>Provider scan, provider redundancy with multi-roaming SIM cards (see section "Suitable accessories") | |
| Cellular Status (UI) | Signal field strength, RSSI, RSCP / Ec/No, RSRP / RSRQ, SINR, cell ID, location ID | |
| **WLAN (WiFi)** (MOROS.neo-EW / -EW.4G) | | |
| Standard | IEEE 802.11a/b/g/n/ac/ax (WiFi 6) | |
| Frequency, TX power | 2,4 & 5GHz, max. 100 mW | |
| WLAN (Wi-Fi) modes | WLAN (Wi-Fi) Station (Client) or WLAN (Wi-Fi) Access Point with up to 16 stations simultaneously | |
| WLAN button | Activation/deactivation, automatic deactivation adjustable (default 120 minutes after activation) | |
| Security | WPA/WPA2/WPA3 (AES, TKIP), 802.1x (EAP: TLS, TTLS, PEAP) | |
| Antenna connection | 1x RP-SMA female | |
| **Hardware interfaces** | | |
| Ethernet ports | 4x RJ45 shielded, 10/100/1000 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 | |
| I/Os | Variants without cellular: | 2 digital inputs or outputs, configurable |
| | Variants with cellular: | 4 digital inputs or outputs, configurable; 1 digital input, high-aktiv (connection to 10...24 V DC, as per EN 61131-2, type 1) |
| RS-485 | 1x RS-485, push-in terminal connector (A, B, GND) | |
| RS-232 | Variants with cellular: 1 x RS-232, push-in terminal connector (RX, TX) | |
| Functions of serial interfaces | Serial-Ethernet gateway (incoming and outgoing connections, Modbus TCP/RTU gateway, modem emulation, editable AT answer list, translation of phone numbers to IP addresses) | |
| Indicators (LEDs) | Power (supply/boot/reset), WAN (internet connection), Info (konfigurable), WLAN (WiFi status)<br>Variants with cellular: SIG (signal indicator), SIM1/SIM2 (aktive SIM card), DI/O (activity at inputs/outputs) | |
| **Network** | | |
| Network functions | Up to 100 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 redundancy/failover | Several WAN connections configurable also in parallel operation, fallback level for connection breakdown (failover), event-based WAN changeover (see events) | |
| Connection check | Periodic, ping/icmp, DNS request, link up/down | |
| 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 | DES EDE 128, DES EDE3 192, AES 128-256 CBC/GCM, SHA 256-512, ChaCha20-Poly1305 | |
| 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, AES 128-256 CBC/GCM, SHA 256-512<br>DH-Group 1-31 (Diffie-Hellman 768 - 25519), ChaCha20-Poly1305 | |

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|---|---|
| WireGuard | WireGuard VPN client/server support |
| 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;<br>MAC filter; pre-defined firewall rules can be activated |
| Security | Secure Boot: cryptographically secured boot process with integrated hardware Root of Trust;<br>Encrypted file system: data encryption using a unique, hardware-protected device key (Arm® TrustZone®);<br>HTTP/HTTPS attack prevention; response upon events:<br>configuration change, link up/down, restart, login attempt, netfilter violation, password hashing |
| **Container and IoT** | |
| Container Runtime | Edge computing with local data processing |
| Edge applications | Proprietary or third-party apps in a Docker-like container environment (LXC) |
| Remote Deployment | Centralized container rollout across the fleet - icom Router Management (iRM) |
| Interfaces | Ability to access the router's peripherals |
| **Events & Actions** | |
| Event & Action Handler | Notification, alarming, diagnosis, attack detection, fault handling, operation and commissioning logic |
| Events / alarms (selection) | Change: digital input, Ethernet port, WAN chain, profile status, supply input, cellular field strength;<br>timer expired, firewall violation, login attempt detection, pulse sequence on digital input, counter, netfilter rule, ping/icmp |
| Event-triggered actions (selection) | Messages via e-mail, SMS (only cellular variants), SNMP traps, MCIP; switch profile, switch connection,<br>change modem state, start timer, switch output or pulse sequence, activate firmware, reset, restart container |
| **Programming environment/scripting** | |
| Container environment | Installation of several application containers (LXC), container with own IP end point,<br>assignment to IP networks - full firewall and routing transparency, access control, SDK available |
| Container resources | CPU: 50% of 64-bit ARM Cortex-A53 Dual Core, RAM: 800 MB, Flash: 7 GB eMMC |
| Lua scripting | Lua interpreter for own scripts |
| **Monitoring and Management** | |
| Monitoring | SNMP traps and agent, system logs, remote syslog (RFC 5424 & 3164), link up/down detection, netfilter violation |
| Certificate management | EST, CRL |
| icom Router Management | Supports central router management for FW updates, configuration management, connection monitoring,<br>container updates, mass rollout, certificate management, available as public/private<br>cloud (server) installation or onPremises |
| **Administration** | |
| Configuration | Web Interface HTTP(S) with session management, command line interface (CLI), Telnet, SSH,<br>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 |
| System time | NTP client and server, buffered real time clock (RTC, power reserve of typ. 25 days) |
| Help | Web interface: inline help, online help; example profiles, Configuration Guides |
| **Supply** | |
| Voltage | 12 ... 24 V DC (±20%: 9,6 … 28,8 V), protected against reverse polarity and surge/transient pulses |
| Terminal | 6-pin push-in terminal connectors (maintenance free), rigid/flexible conductors up to 1.5 mm² |
| Power consumption (value depends on data throughput amongst others) | MOROS.neo-E: typical approx. 3W, max. 5W<br>MOROS.neo-EW: typical approx. 3W, max. 5W<br>MOROS.neo-E.4G: typical approx. 4W, max. 8W<br>MOROS.neo-EW.4G: typical approx. 4W, max. 8W |

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## VPN-Router / IoT-Gateways

| Ambient conditions | |
|---|---|
| Dimensions | 45 x 113 x 94 mm (W x H x D) |
| Weight | MOROS.neo-E: 180 g<br>MOROS.neo-EW: 185 g<br>MOROS.neo-E.4G: 255 g<br>MOROS.neo-EW.4G: 260 g |
| Mounting | DIN rail mounting (integrated clip), 2,5 horizontal pitch (HP) on DIN rail |
| Operating temperature | -30 ... +75 °C [1] MOROS.neo-E / -EW<br>-30 ... +70 °C [2] MOROS.neo-E.4G / -EW.4G |
| Storage temperature | -30 ... +75 °C |
| Humidity | 0 … 95 % (non-condensing) |
| IP rating | IP30 |
| **Approvals & Standards** | |
| Certifications | All variants: CE<br>Additionally for MOROS.neo-E / -E.4G: FCC part 15 class B, IC (ISED Canada) |
| Validity regions of certifications | CE: all EU countries, Albania, Bosnia and Herzegovina, Georgia, Iceland, Liechtenstein, Moldova, Montenegro, North Macedonia, Norway, Switzerland, Serbia, Turkey, Ukraine, United Kingdom<br>FCC part 15 class B: USA<br>IC (ISED Canada): Canada |
| EMC | Emission: EN 55032 Class B, EN 61000-6-3; immunity: EN 55035 (replaces EN 55024), EN 61000-6-2 |
| Safety | IEC/EN 62368-1 |
| Environmental conditions | Vibration and mechanical shock tests as per DIN EN 61131-2 in accordance with EN 60068-2-6 and EN 60068-2-27;<br>Temperature tests as per EN 60068-2-1, EN 60068-2-2, EN 60068-2-14, EN 60068-2-30 |
| Operating time [3] | MTBF > 645,000 h (25 °C), according to SN 29500 standard (according to IEC 61709) |

[1] +70 … +75 °C: extended temperature range (refer to www.insys-icom.com/en/extended-temperature-range/)

[2] +65 … +70 °C: extended temperature range (refer to www.insys-icom.com/en/extended-temperature-range/)

[3] MTBF determined with variant MOROS.neo-EW.4G

# MOROS.neo

## Order Numbers and Accessories

### Available variants MOROS.neo

| Product name | Features | Art. no. |
|---|---|---|
| MOROS.neo-E | LAN-to-LAN router, 4 Gbit-Ethernet-Ports, 2 digital inputs/outputs, 1x RS-485 | 10026220 |
| MOROS.neo-EW | WiFi-/LAN-to-LAN router, WiFi 6, 4 Gbit Ethernet ports, 2 digital inputs/outputs, 1x RS-485 | 10026221 |
| MOROS.neo-E.4G | 4G cellular router, worldwide frequency bands, 4 Gbit Ethernet ports, 4 digital inputs/outputs, 1 digital input, 1x RS-485, 1x RS-232 | 10026219 |
| MOROS.neo-EW.4G | 4G cellular/WiFi router, worldwide frequency bands, WiFi 6, 4 Gbit Ethernet ports, 4 digital inputs/outputs, 1 digital input, 1x RS-485, 1x RS-232 | 10026166 |

### Suitable accessories

| Product name | Description | Art. no. |
|---|---|---|
| Magnetic Antenna 4G IP65 3m | Magnet mounting, height 72 mm, 3 m cable, SMA (m), ingres protection IP65 | 10019504 |
| Wall Antenna 4G IP67 5m | Wall mounting, height 220 mm, 5 m cable, SMA (m), ingres protection IP67 | 10020596 |
| Allround Antenna 5G/4G IP66 5m | Screw or wall mounting, height 82 mm, 5 m cable, SMA (m), ingres protection IP67 | 10022961 |
| Roof Mount Antenna 4G IP67 3m | Screw mounting, height 15 mm, 3 m cable, SMA (m), ingres protection IP67 | 10022309 |
| Screw/wall Antenna 2x2 MIMO 5G IP69 IK09 3m | Dual antenna MIMO, screw oder wall mounting, height 126 mm, width 104 mm. depth 100 mm, 2x 3 cable, SMA (m), ingres protection IP69, IK09 | 10026305 |
| Magnetic Antenna 2x2 MIMO 5G/4G IP65 3m | Dual antenna MIMO, magnetic mounting, height 61 mm, width 150 mm, 2x 3 m cable, SMA (m), ingres protection IP65 | 10022963 |
| Panel Antenna 2x2 MIMO 5G/4G IP65 5m | Dual antenna MIMO, wall- / pole- / desk mounting, height/width 155 mm, 2x 5 m cable, SMA (m), ingres protection IP65 | 10022962 |
| 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 |
| Magnetic Antenna WiFi IP69 IK09 1.5m | 2,4 & 5GHz, magnet mounting, heigt 68 mm, diameter 54 mm, 1,5 m cable, RP-SMA (m), protection IP67, IP69 (ingres) and IK09 (vandalism) | 10026503 |
| Wall Antenna WiFi IP67 2m | 2,4 & 5 GHz, wall mounting, height 187 mm, 2 m cable, RP-SMA (m), ingres protection IP67 | 10026556 |
| Power supply 24V 15W | Power supply unit for DIN rail, wide-range input voltage AC and DC, 15 W output power, protection against short circuit / overload / over voltage | 10022848 |
| Power supply 24V 30W | Power supply unit for DIN rail, wide-range input voltage AC and DC, 30 W output power, protection against short circuit / overload / over voltage | 10026178 |
| Wall power supply 24V 25W international | Power supply AC/DC with mains plug, suitable for desktop use, wide input voltage range, 25W output power, 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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