

NM31

Fully Managed 8-Port Railway Ethernet Switch with PoE Rugged Embedded Network Box

- » Fully managed 8-port rugged Ethernet switch
- » M12 D, A or X-Coded connectors on the front panel
- » 10/100 (Fast) or 10/100/1000 Mbit/s variants
- » 29 Gbit/s carrier grade switching matrix
- » ITU G.8031/G.8032 Ethernet Linear/Ring Protection
- » PoE+ Power Sourcing Equipment (PSE), up to 60 W output power
- » Fanless and maintenance-free design
- » Ultra wide range power supply input (14.4 to 154 V DC) with interruption class S2
- » -40°C to +70 (+85)°C with qualified components
- » Compliant to EN 50155 (railways)



Maintenance Free and Extremely Rugged

The NM31 family is a range of 8-port fanless and maintenance-free managed Ethernet switches, developed specifically for rough environmental conditions in rolling stock applications.

High Speed, High Efficiency and Extensive Protocols

The NM31 range of managed switches provide the additional ability to configure, manage and monitor the LAN which allows more control over how data travels through the network and who has access. The use of the identical firmware as provided for the [G101 Ethernet Switch](#), simplifies complex administration and reduces efforts for administrator training.

Versatile Application Possibilities

The NM31 range provide eight channels at the front panel, accessible through M12 connectors and cover different application requirements including with or without PoE+, IEEE802.3at type 1 and type 2 (previously af and at) compliant, and either 100 Mb or 1Gb Ethernet interfaces.

Compliant to Railway Standards

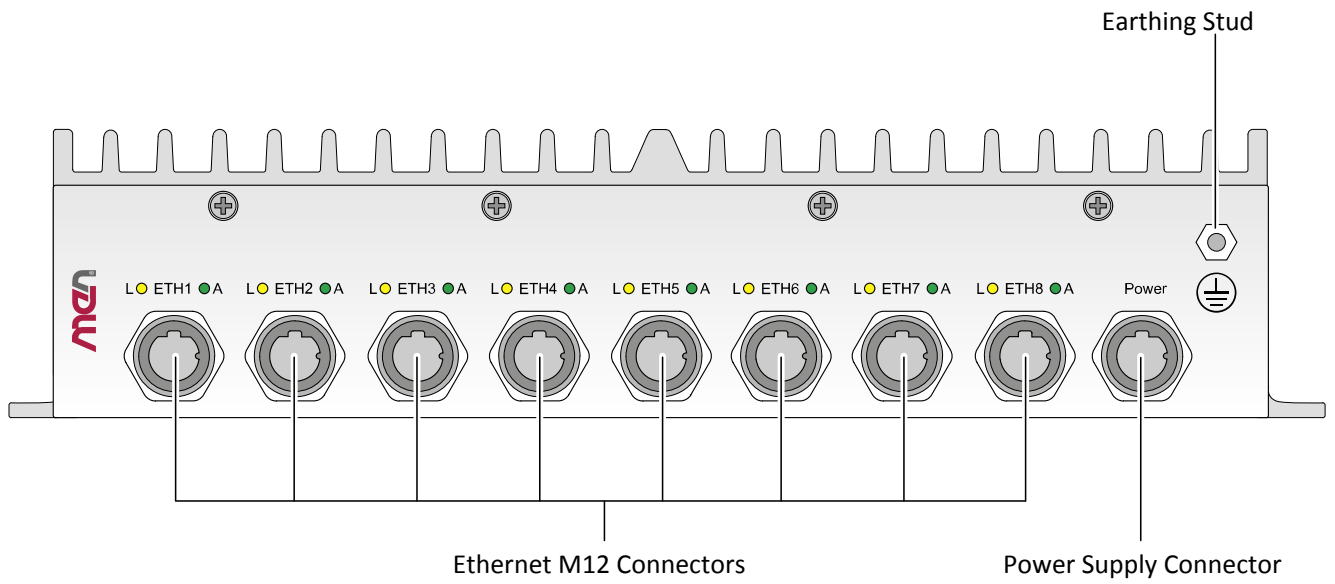
The voltage supply for the NM31 Managed Ethernet Switch is designed for maximum flexibility and supports wide range input supply voltages from 14.4 to 154 V DC, and meets all EN50155 class S2 requirements for voltages ranging 24 to 110 VDC.

Conduction Cooled

The NM31 is designed for fanless operation at temperatures ranging from -40 to +70°C. The NM31 features IP40 protection when surface-mounted and cooling fins which serve as a heatsink for the internal electronics, and in this way provides conduction cooling.

Familiar Family Concept

As a member of MEN's family of extremely rugged industrial box PCs, the NM31 provides the same flexibility and scalability, as well as a look and feel which is common to the family.



Supported Port Types

- The following configurations are available:
 - 8x 10/100BASE-T fully managed switch with D-coded connectors, 8x PoE + PSE with max. 60 W output power (Model: 09NM31-01)
 - 8x 10/100/1000BASE-T fully managed switch with A-coded connectors, 8x PoE + PSE with max. 60 W output power (Model: 09NM31-03)
 - 8x 10/100/1000BASE-T fully managed switch with X-coded connectors, 8x PoE + PSE with max. 60 W output power (Model: 09NM31-05)

Protocols and Functionality

- IEEE 802.3 for 10BASE-T
- IEEE 802.3u for 100BASE-T
- IEEE 802.3ab for 1000BASE-T
- General Network Support
 - IPv4
 - IPv6 Ready
 - IPv6 Ready Phase 2
- Host Configuration Protocols
 - DHCP Server / Client
 - DHCP Option 82
 - DHCP Snooping
 - DHCP ARP Inspection
- DNS
 - DNS Client (RFC 2136)
 - DNS Proxy (RFC 5625)

Ports and Port Control

- Energy Efficient Ethernet (IEEE 802.3az)
- ETH Signal Equalization and Power Control
- Port state (admin), speed, duplex mode and flow control
- Port frame size (Jumbo Frames: 9216 Bytes max.)
- Port status (link monitoring) and statistics (MIB counters)
- Port VeriPHY (cable diagnostics), ActiPHY and
- PerfectReach
- Inband management (VRAP)

Switch Management and Monitoring

- OAM
 - Link OAM: IEEE 802.3ah (a.k.a. EFM)
 - CFM: IEEE 802.1ag
 - ITU-T Y.1731 Down-MEP, ITU-T Y.1731 Up-MEP, ITU-T Y.1731 MIP
 - MEF E-LMI Configuration Management
 - SMAC/DMAC Swap
 - OAM Performance Monitoring MEF35 Phase 1
- SNMP Management v1, v2c, v3 (RFC 1212, 1901-1908, 3411-3418)
- SNMP v1 Traps (RFC 1157) with multiple destinations
- LLDP (IEEE 802.10AB)
- TIA 1057 LLDP-MED extensions
- CDP (Cisco Discovery Protocol)
- RMON Group 1, 2, 3 and 9 (RFC 2819)
- Syslog (RFC 5424)
- sFlow (RFC 3176)
- Port and Flow Mirroring
- Fallback Firmware

Configuration Management

- TFTP (RFC 1350)
- Fallback Configuration
- Configurable by Web / CLI / Telnet / SSL / Console

Redundancy and Flow Control

- Static Link Aggregation
- IEEE 802.3ad Link Aggregation Protocol
- IEEE 802.3X Back Pressure Flow Control
- IEEE 802.1D Spanning Tree Protocol (STP)
- IEEE 802.1w Rapid STP (RSTP)
- IEEE 802.1s Multiple STP (MSTP)
- BPDU Guard / Restrict Role
- ITU-T:G.8032 Ring Protection
- ITU-T:G.8031 Linear Protection
- IEEE 802.1ag / ITU-T Y.1731 Connectivity Fault Protection
- Loop Protection

Security

- Network Access Server (NAS):
 - Port-based IEEE 802.1x
 - Single and multiple IEEE 802.1x
 - MAC based authentication
 - VLAN and QOS assignment
 - Guest VLAN
- RADIUS accounting (RFC 2866ff)
- MAC address limit and MAC freeze
- IP MAC Binding / Binfind dynamic to static
- TACACS+ Accounting
- Web and CLI Authentication
- IP Source guard
- Authorization (15 user levels)
- DHCP Snooping (RFC 2132)
- Dynamic ARP Inspection

VLAN

- VLAN Tagging and Trunking (IEEE 802.1Q)
- Supported VLAN Types:
 - Private Static VLAN (RFC 5517)
 - MAC, Protocol, IP-Subnet and Port based VLAN (IEEE 802.1Q)
 - VOICE VLAN (IEEE 802.1Q, IEEE 802.1P)
- Dynamic VLANs (GVRP)
- Multicast VLAN Registration (IEEE 802.1ak MRP and MVRP)

Multicast

- IPv4 Internet Group Management protocol (IGMP) v1, v2, v3
- Maximum number of IGMP Groups:
 - 8000 for Layer2
 - 8000 for IP4/IP6
- IPv6 Multicast Listener Protocol (MLD) v1, v2
- Multicast VLAN registration protocol (MVR)
- MRP/GMRP Multicast Registration Protocol (IEEE 802.1ak)

QoS

- Active Priority Queues per Port: 8
- Class of Service (IEEE 802.1p)
- Port and queue egress shaper
- Storm control (for Unicast, Broadcast, Multicast, unknown)
- Port and Queue Egress shaper
- Scheduler Mode (weighted and fair scheduling)
- Port Default/User Priority and Input Priority Mapping
- DCSP remarking (RFC 2474)
- QoS control list (QCL mode)
- Random Early Detection (RED, RFC 2309)
- Policers (port, service, queue and global/VCAP - ACL)
- DiffServ (RFC 2474) and Tag remarking

Synchronization

- NTPv4 Client (RFC 5005)
- IEEE 1588v2 PTP with one-step and two-step clock
- IEEE 1588v2 PTP with redundant master clocks
- IEEE 1588v2 boundary clock
- IEEE 1588v2 unicast and multicast support

Power Over Ethernet Features

- Power over Ethernet functions on all ports
 - PSE (Power Sourcing Equipment) function
 - Up to 60 W total output power
- Derating
 - > 55°C: 0.9W/K

Service Interface

- Console interface
 - RS232 rear console port for local system management
- Web interface
 - Web based control and management interface over any Ethernet port

Front Interfaces

- Ethernet
 - Eight M12 connectors
- Ethernet LED
- Power supply
 - One M12 connector for ultra wide range power
- Power status LED
 - Indicates power supply stability or range validity

Rear Interfaces

- RS232
 - One M12 service console

Electrical Specifications

- Supply voltage
 - 14.4 VDC to 154 VDC
 - Nominal voltages 24, 36, 48, 72, 96 and 110V VDC, according to EN50155
 - Power interruption class S2 (10 ms)
 - 18 VDC to 32 VDC
- Power consumption
 - +85 W max.

Mechanical Specifications

- Dimensions: Height 44.1 mm x Width 220 mm x Length 164 mm
- Weight
 - 10/100BASE-T managed switch: 1400 g
 - 10/100/1000BASE-T managed switch: 1500 g

Environmental Specifications

- IP protection
 - IP40 when surface-mounted
- Temperature range (operation)
 - -40°C to 70°C (qualified components), with up to 85°C for 10 minutes according to class Tx (EN 50155)
 - Fanless operation
- Temperature range (storage): -40°C to +85°C
- Relative humidity (operation): max. 95% non-condensing
- Relative humidity (storage): max. 95% non-condensing
- Altitude: -300 m to +3000 m
- Shock: 50 m/s², 30 ms (EN 61373)
- Vibration (function): 1 m/s², 5 Hz to 150 Hz (EN 61373)
- Vibration (lifetime): 7.9 m/s², 5 Hz to 150 Hz (EN 61373)

Reliability

- MTBF: 511 624 h @ 40°C according to IEC/TR 62380 (RDF 2000)
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Safety

- Flammability (PCBs)
 - UL 94 V-0
 - Fire Protection
 - EN 45545-2
 - Electrical Safety
 - EN 50153:2014 / EN 50155:2007
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EMC Conformity (Railway)

- EN 50121-3-2:2015
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Software Support

- Firmware for configuration and management included

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Up-to-date information, documentation and ordering information:

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