TN-4500A Series

EN 50155 12+4G/24+4G-port Gigabit Ethernet switches with up to 20 PoE ports

- Up to 4 Gigabit ports with PoE function
- Isolated power with wide 24 to 110 VDC power supply range
- 2 gigabit fiber ports with embedded multi-mode Q-ODC® interface on fiber models
- 2 gigabit ports with bypass relay function on bypass models
- Complies with all EN 50155 mandatory test items*
- -40 to 75°C operating temperature range
- Turbo Ring and Turbo Chain (recovery time < 20 ms @ 250 switches), and STP/RSTP/MSTP for network redundancy
- Up to 20 IEEE 802.3at/af compliant combo PoE and Ethernet ports
- Provides up to 30 watts per PoE port

*This product is suitable for rolling stock railway applications, as defined by the EN 50155 standard. For a more detailed statement, click here: www.moxa.com/doc/specs/EN_50155_Compliance.pdf

Introduction

The ToughNet TN-4500A series M12 managed Ethernet switches are designed for railway applications, including rolling stock and wayside installations. The switches use M12 and other circular connectors to ensure tight, robust connections, and guarantee reliable operation in industrial environments where vibration and shock are commonplace. The TN-4500A series Ethernet switches provide 12 or 24 fast Ethernet M12 ports with or without IEEE 802.3at/af compliant PoE (Power-over-Ethernet) functionality, and the gigabit models have 4 gigabit Ethernet interfaces with PoE and optional bypass relay functionality. In addition, the fiber models provide 2 gigabit fiber interface ports with an embedded 2 km multimode fiber transceiver. The PoE switches are classified as power source equipment (PSE). They provide up to 30 watts of power per port, and can be used to power IEEE 802.3at/af compliant powered devices (PDs), such as IP cameras, wireless access points, and IP phones. The 24 to 110 VDC wide power input range and isolated dual power inputs not only allow you to use the same type of power source at different sites around the globe, but also increase the reliability of your communications system. Furthermore, the -40 to 75°C operating temperature and IP42-rated enclosure allow deployment in harsh environments. The TN-4500A series Ethernet switches are compliant with mandatory sections of EN 50155, covering operating temperature, power input voltage, surge, ESD, and vibration, as well as conformal coating and power insulation, making the switches suitable for a variety of industrial applications.

Features and Benefits

- Provides up to 30 watts per PoE port with a total power budget of 120 watts per switch
- IPv6 Ready logo awarded (IPv6 Logo Committee certified)
- Leading EN 50155-compliant PoE switches for rolling stock applications
- DHCP Option 82 for IP address assignment with different policies
- Turbo Ring and Turbo Chain (recovery time < 20 ms @ 250 switches), and STP/RSTP/MSTP for network redundancy
- IGMP snooping and GMRP for filtering multicast traffic
- EtherNet/IP and Modbus/TCP industrial Ethernet protocols supported
- Port-based VLAN, IEEE 802.1Q VLAN, and GVRP to ease network planning
- QoS (IEEE 802.1p/1Q and ToS/DiffServ) allows real-time traffic classification and prioritization
- IEEE 802.3ad, LACP for optimum bandwidth utilization
- SNMPv1/v2c/v3 for different levels of network management
- TACACS+, SNMPv3, IEEE 802.1X, HTTPS, and SSH to enhance network security
- RMON for efficient network monitoring and proactive capability
- Bandwidth management prevents unpredictable network status
- Lock port allows access by only authorized MAC addresses
- Port mirroring for online debugging
- Automatic warning by exception through email and relay output
- Line-swap fast recovery
- LLDP for automatic topology discovery in network management software
- Configurable by web browser, Telnet/serial console, CLI, and Windows utility
- Loop protection prevents network loops
- Panel mounting installation capability

Specifications

Technology

Standards:
IEEE 802.3 for 10BaseT
IEEE 802.3u for 100BaseT(X)
IEEE 802.3ab for 1000BaseT(X)
IEEE 802.3x for Flow Control
IEEE 802.1D-2004 for Spanning Tree Protocol
IEEE 802.1w for Rapid Spanning Tree Protocol
IEEE 802.1s for Multiple Spanning Tree Protocol
IEEE 802.1Q for VLAN Tagging
IEEE 802.1p for Class of Service
IEEE 802.1X for Authentication
IEEE 802.3ad for Port Trunk with LACP

Software Features

Management: IPv4/IPv6, SNMP v1/v2c/v3, Telnet, LLDP, Port Mirror, Syslog, RMON, BootP, DHCP Server/Client, DHCP Option 66/67/82, TFTP, SMTP, RARP, HTTP, HTTPS, SNMP inform, Flow Control, Back pressure flow control
Filter: 802.1Q VLAN, Port-Based VLAN, GVRP, IGMPv1/v2, GMRP, Static Multicast
Redundancy Protocols: STP/RSTP, MSTP, Turbo Ring v1/v2, Turbo Ring v2 with DRC, Turbo Chain, Link Aggregation
Security: RADIUS, TACACS+, SSL, SSH, Port Lock, Broadcast Storm Protection, Rate Limit
Time Management: SNTP, NTP Server/Client, IEEE 1588v2 PTP (SW-based)
MIB: MIB-II, Ethernet-like MIB, P-BRIDGE MIB, Q-BRIDGE MIB, Bridge MIB, RSTP MIB, RMON MIB Group 1, 2, 3, 9

Switch Properties

Priority Queues: 4
Max. Number of VLANs: 64
VLAN ID Range: VID 1 to 4094
IGMP Groups: 256

Interface

Fast Ethernet: Front cabling, M12 D-coded 4-pin female connector, 10/100BaseT(X) auto negotiation speed, F/H duplex mode, and auto MDI/MDI-X connection
Gigabit Ethernet: Front cabling, M12 X-coded 8-pin connector, 10/100/1000BaseT(X) auto negotiation speed, F/H duplex mode, auto MDI/MDI-X connection
Console Port: M12 A-coding 5-pin male connector
Alarm Contact: 2 relay outputs in one M12 A-coding 5-pin male connector with current carrying capacity of 1 A @ 30 VDC

Optical Fiber

		Gigabit Ethernet Q-ODC
		Multi-Mode
Fiber Cable Type		62.5/125 µm
		2500 MHz*km
Typical Distance		2 km
Wave-length	Typical (nm)	1310
	TX Range (nm)	1280 to 1340
	RX Range (nm)	1100 to 1600
Optical Power	TX Range (dBm)	-5 to -15
	RX Range (dBm)	-3 to -36
	Link Budget (dB)	21
	Dispersion Penalty (dB)	12

Power Requirements

Input Voltage: 24/36/48/72/96/110 VDC
Operating Voltage: 16.8 to 137.5 VDC
Input Current:
TN-4516A non-PoE series: Max. 0.7 A @ 24 VDC
TN-4516A-PoE series: Max. 7.0 A @ 24 VDC
TN-4516A fiber series: Max. 7.0 A @ 24 VDC
TN-4524A-PoE series: Max. 6.5 A @ 24 VDC
TN-4528A-PoE series: Max. 7.2 A @ 24 VDC
TN-4528A fiber series: Max. 7.2 A @ 24 VDC
Overload Current Protection: Present
Connection: M23 connector
Reverse Polarity Protection: Present

Physical Characteristics

Housing: Metal
IP Rating: IP42 protection (optional protective caps available for unused ports)
Dimensions:
TN-4516A non-PoE series: 229.8 x 132 x 122.3 mm (9.05 x 5.20 x 4.81 in)
TN-4516A-PoE series: 229.8 x 132 x 122.3 mm (9.05 x 5.20 x 4.81 in)
TN-4516A fIber series: 229.8 x 132 x 122.3 mm (9.05 x 5.20 x 4.81 in)
TN-4524A-PoE series: 347.8 x 132 x 122.3 mm (13.70 x 5.20 x 4.81 in)
TN-4528A-PoE series: 347.8 x 132 x 122.3 mm (13.70 x 5.20 x 4.81 in)
TN-4528A fiber series: 347.8 x 132 x 122.3 mm (13.70 x 5.20 x 4.81 in)
Weight:
TN-4516A non-PoE series: 1965 g (4.32 lb)
TN-4516A-PoE series: 2607 g (5.74 lb)
TN-4516A fiber series: 2705 g (5.96 lb)
TN-4524A-PoE series: 3063 g (6.74 lb)
TN-4528A-PoE series: 3304 g (7.27 lb)
TN-4528A fiber series: 3375 g (7.44 lb)
Installation: Panel mounting

Environmental Limits

Operating Temperature: -40 to 75°C (-40 to 167°F)
Storage Temperature: -40 to 85°C (-40 to 185°F)
Ambient Relative Humidity: 5 to 95% (non-condensing)
Altitude: 2000 m
Please contact Moxa if you require products guaranteed to function at higher altitudes

Standards and Certifications

Note: Please check Moxa's website for the most up-to-date certification status.
Safety: UL 61010-2-201 (Pending), EN 60950-1 (LVD)
EMC: EN 55032, EN 55024
EMI: CISPR 32, FCC Part 15B Class A
EMS:
IEC 61000-4-2 ESD: Contact: 6 kV; Air: 8 kV
IEC 61000-4-3 RS: 80 MHz to 1 GHz: 20 V/m
IEC 61000-4-4 EFT: Power: 2 kV; Signal: 2 kV
IEC 61000-4-5 Surge: Power: 2 kV; Signal: 2 kV
IEC 61000-4-6 CS: 10 V
IEC 61000-4-8
Rail Traffic: (for panel mounting installations)
EN 50155*, EN 50121-4, EN 45545-2
*This product is suitable for rolling stock railway applications, as defined by the EN 50155 standard. For a more detailed statement, click here: www.moxa.com/doc/specs/EN_50155_Compliance.pdf
Shock: EN 50155, IEC 61373
Freefall: IEC 60068-2-31
Vibration: EN 50155, IEC 61373

MTBF (mean time between failures)

Time:
TN-4516A-4GTX-WV-T: 599,164 hrs
TN-4516A-4GTXBP-WV-T: 589,421 hrs
TN-4516A-12PoE-4GPoE-WV-T: 428,680 hrs
TN-4516A-12PoE-2GPoE-2GTXBP-WV-T: 427,322 hrs
TN-4516A-12PoE-2GPoE-2GODC-WV-T: 421,432 hrs
TN-4524A-16PoE-WV-T: 429,402 hrs
TN-4528A-16PoE-4GPoE-WV-T: 393,894 hrs
TN-4528A-16PoE-2GPoE-2GTXBP-WV-T: 392,746 hrs
TN-4528A-16PoE-2GPoE-2GODC-WV-T: 387,767 hrs
Standard: Telcordia SR332

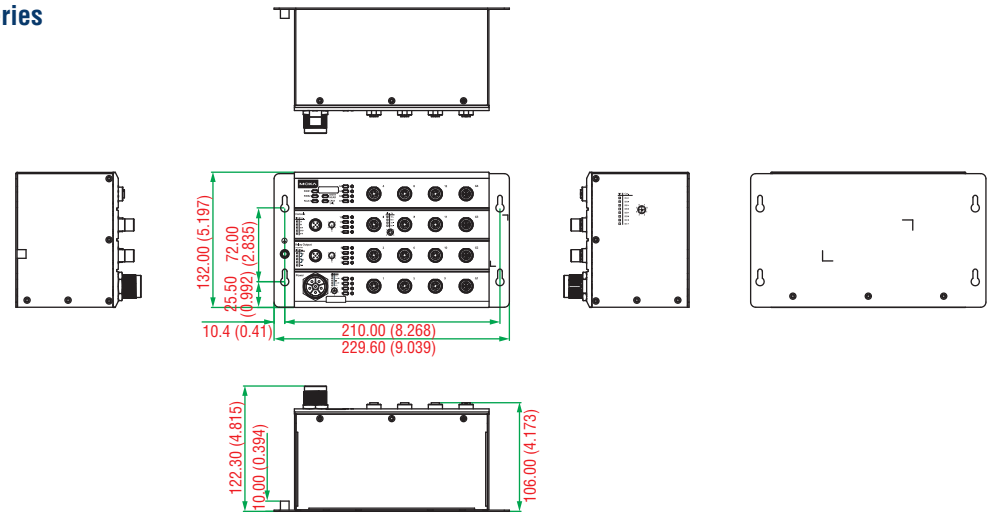
Warranty

Warranty Period: 5 years
Details: See www.moxa.com/warranty

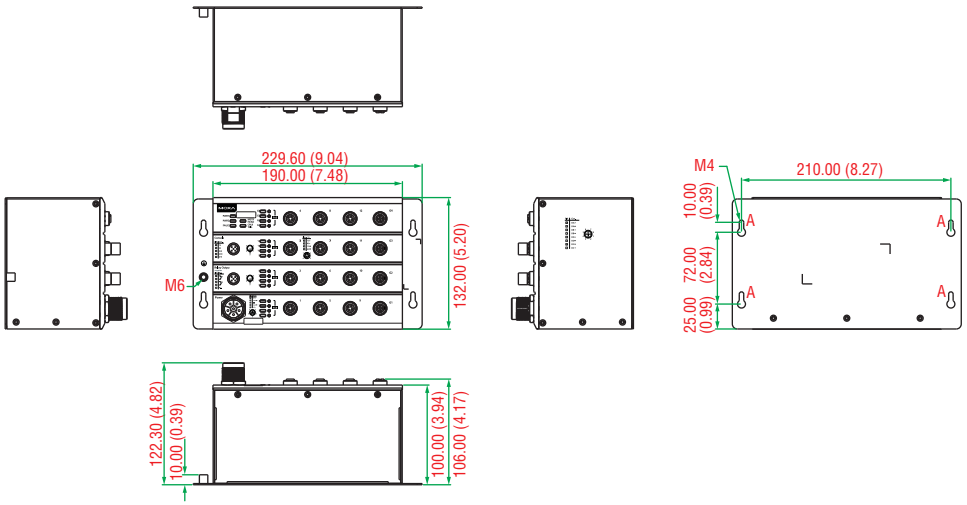
Dimensions

Unit: mm (in)

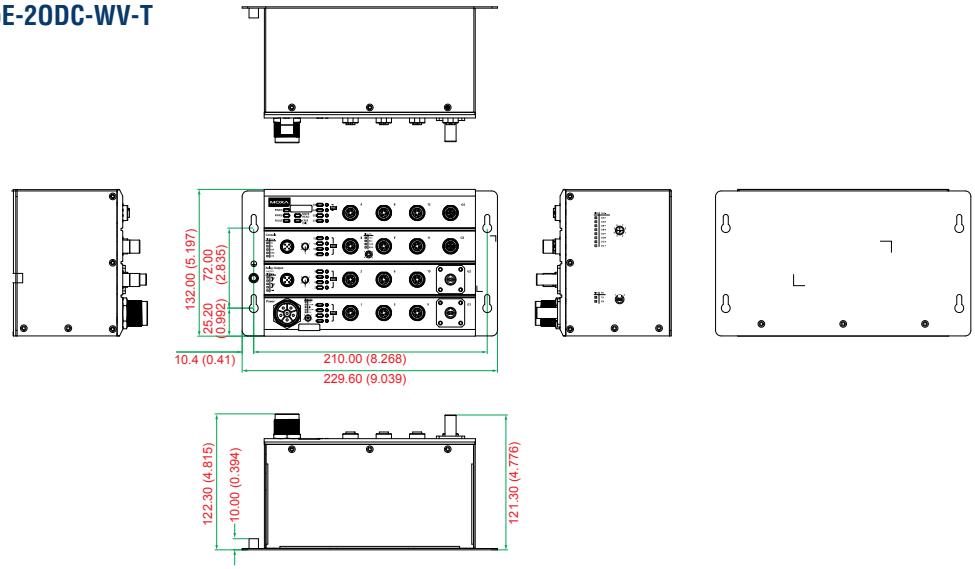
TN-4516A non-PoE Series



TN-4516A PoE Series



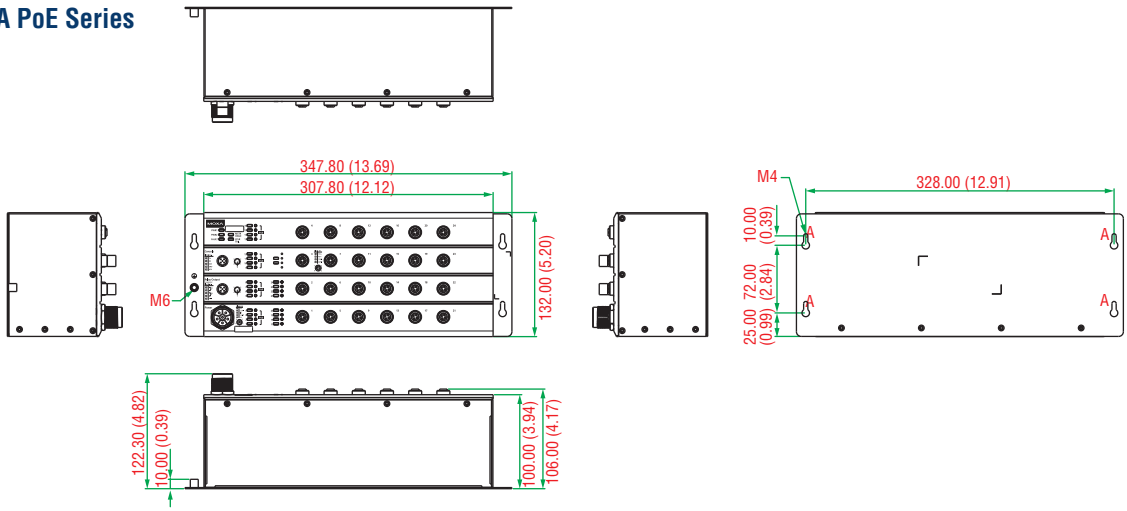
TN-4516A-12PoE-2GPoE-2ODC-WV-T



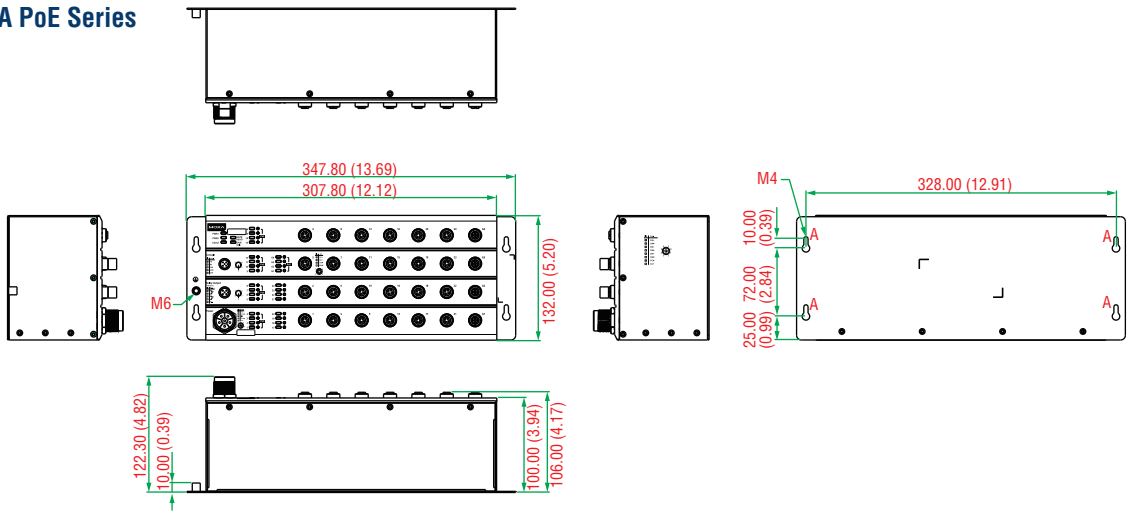
Dimensions

Unit: mm (in)

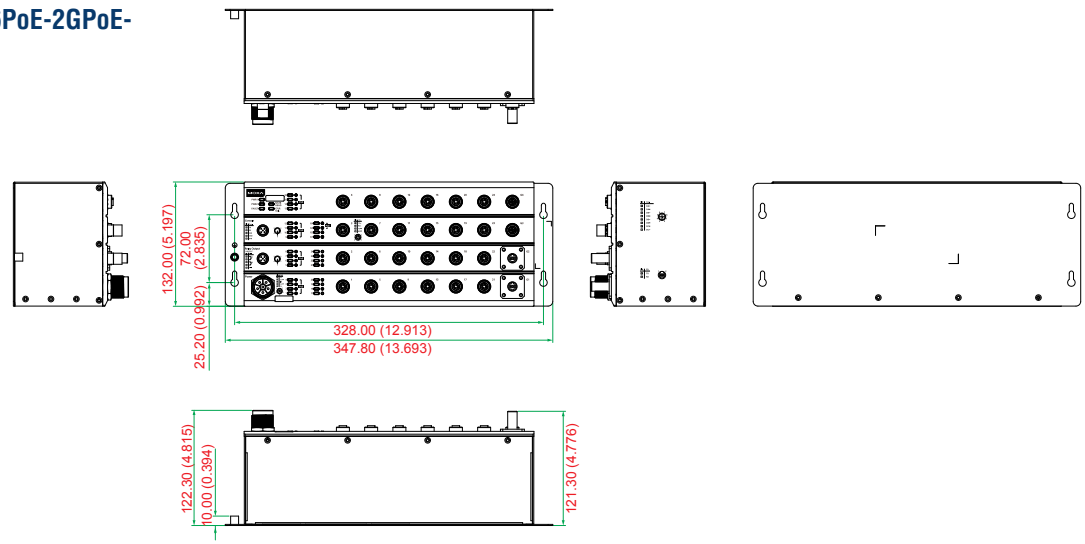
TN-4524A PoE Series



TN-4528A PoE Series



TN-4528A-16PoE-2GPoE-2ODC-WV-T



Ordering Information

Available Models	Port Interface						Power Supply	Conformal Coating
	Front Cabling							
Wide Temperature (-40 to 75C)	PoE,10/100 Base-T(X), M12 connector	10/100 Base-T(X), M12 connector	PoE,10/100/1000 Base-T(X), M12 connector	10/100/1000 Base-T(X), M12 connector	10/100/1000 BaseT(X), M12 connector with bypass relay	1000BaseLSX fiber optic, Q-ODC® interface	WV: 24 to 110 VDC (16.8 to 137.5 VDC)	
TN-4516A-4GTX Series								
TN-4516A-4GTX-WV-T	–	12	–	4	–	–	1 (dual inputs)	–
TN-4516A-4GTX-WV-CT-T	–	12	–	4	–	–	1 (dual inputs)	✓
TN-4516A-4GTXBP-WV-T	–	12	–	–	4	–	1 (dual inputs)	–
TN-4516A-4GTXBP-WV-CT-T	–	12	–	–	4	–	1 (dual inputs)	✓
TN-4516A PoE Series								
TN-4516A-12PoE-4GPoE-WV-T	12	–	4	–	–	–	1 (dual inputs)	–
TN-4516A-12PoE-4GPoE-WV-CT-T	12	–	4	–	–	–	1 (dual inputs)	✓
TN-4516A-12PoE-2GPoE-2GTXBP-WV-T	12	–	2	–	2	–	1 (dual inputs)	–
TN-4516A-12PoE-2GPoE-2GTXBP-WV-CT-T	12	–	2	–	2	–	1 (dual inputs)	✓
TN-4516A Fiber Series								
TN-4516A-12PoE-2GPoE-2GODC-WV-T	12	–	2	–	–	2	1 (dual inputs)	–
TN-4516A-12PoE-2GPoE-2GODC-WV-CT-T	12	–	2	–	–	2	1 (dual inputs)	✓
TN-4524A PoE Series								
TN-4524A-16PoE-WV-T	16	8	–	–	–	–	1 (dual inputs)	–
TN-4524A-16PoE-WV-CT-T	16	8	–	–	–	–	1 (dual inputs)	✓
TN-4528A PoE Series								
TN-4528A-16PoE-4GPoE-WV-T	16	8	4	–	–	–	1 (dual inputs)	–
TN-4528A-16PoE-4GPoE-WV-CT-T	16	8	4	–	–	–	1 (dual inputs)	✓
TN-4528A-16PoE-2GPoE-2GTXBP-WV-T	16	8	2	–	2	–	1 (dual inputs)	–
TN-4528A-16PoE-2GPoE-2GTXBP-WV-CT-T	16	8	2	–	2	–	1 (dual inputs)	✓
TN-4528A Fiber Series								
TN-4528A-16PoE-2GPoE-2GODC-WV-T	16	8	2	–	–	2	1 (dual inputs)	–
TN-4528A-16PoE-2GPoE-2GODC-WV-CT-T	16	8	2	–	–	2	1 (dual inputs)	✓

Optional Accessories (can be purchased separately)

Power Cords, M12/M23 Connectors, Protective Caps: See the EN 50155 Switch Accessories datasheet for details
MXview: Moxa industrial network management software with 50, 100, 250, 500, 1000, or 2000 nodes
EDS-SNMP OPC Server Pro: OPC server software that works with all SNMP devices
ABC-01-M12: Configuration backup and restoration tool for TN series managed Ethernet switches, 0 to 60°C operating temperature

Package Checklist

- TN-4500A switch
- M12-to-DB9 console port cable
- 2 protective caps for console and relay output ports
- Panel mounting kit
- Documentation and software CD
- Hardware installation guide
- Warranty card

EN 50155 Switch Accessories

M12/M23 Cords

CBL-M12D(MM4P)/RJ45-100 IP67
1-meter M12-to-RJ45 Cat-5C UTP Ethernet cable with
IP67-rated 4-pin male D-coded M12 connector

CBL-M12(FF5P)/OPEN-100 IP67
1-meter M12-to-5-pin power cable with IP67-rated
5-pin female A-coded M12 connector

CBL-M23(FF6P)/Open-BK-100 IP67
1-meter M23-to-6-pin power cable with
IP67-rated 6-pin female M23 connector

CBL-M12XMM8PRJ45-Y-200-IP67
2-meter M12-to-RJ45 Cat-5 UTP Ethernet cable with
IP67-rated 8-pin male X-coded crimp type M12 connector

CBL-M12XMM8P-Y-300-IP67
3-meter M12-to-M12 Cat-5 UTP Ethernet cable with
IP67-rated 8-pin male X-coded crimp type M12 connector

CBL-M12XMM8P-Y-100-IP67
1-meter M12-to-M12 Cat-5 UTP Ethernet cable with
IP67-rated 8-pin male X-coded crimp type M12 connector

M12 Connectors

M12D-4P-IP68
Field-installable M12 D-coded screw-in
sensor connector, 4-pin male, IP68-rated

M12A-5P-IP68
Field-installable M12 A-coded screw-in
sensor connector, 5-pin female, IP68-rated

M12X-8PMM-IP67-HTG
Field-installable M12 X-coded crimp type,
slim design connector, 8-pin male, IP67-rated

M12 IP67 Protective Caps

A-CAP-M12F-M

Metal cap for M12 female connector

A-CAP-M12M-M

Metal cap for M12 male connector

M23 Connectors

A-PLG-WPM23-01

M23 cable connector, 6-pin female, crimp type

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