TN-4500A Series (HW 1.x, 2.x) Quick Installation Guide

Moxa ToughNet Switch

Version 3.1, June 2023

Technical Support Contact Information
www.moxa.com/support

P/N: 1802045000014

Overview

The ToughNet TN-4500A Series M12 managed Ethernet switches are designed for industrial applications in harsh environments. The TN series switches use M12 connectors to ensure tight, robust connections, and guarantee reliable operation against environmental disturbances, such as vibration and shock. The wide 24 to 110 VDC dual power inputs increases the reliability of your communications.

The TN-4500A Series includes PoE, non-PoE, and fiber switches.

- TN-4516A non-PoE models: 12 Fast Ethernet M12 ports; 4 Gigabit Ethernet ports.
- TN-4516A PoE models: 12 Fast Ethernet M12 ports with PoE functionality; 4 Gigabit Ethernet ports with PoE functionality.
- TN-4516A fiber (ODC) models: 12 Fast Ethernet M12 ports with PoE functionality; 2 Gigabit Ethernet ports with PoE functionality; 2 Gigabit Ethernet ports with a Q-ODC fiber connector.
- TN-4524A PoE models: 24 Fast Ethernet M12 ports, 16 with PoE functionality.
- TN-4528A PoE models: 24 Fast Ethernet M12 ports, 16 with PoE functionality; 4 Gigabit Ethernet ports with PoE functionality.
- TN-4528A fiber (ODC) models: 24 Fast Ethernet M12 ports, 16 with PoE functionality; 2 Gigabit Ethernet ports with PoE functionality; 2 Gigabit Ethernet ports with a Q-ODC fiber connector.

The -40 to 75°C operating temperature and IP42-rated waterproof 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.

Package Checklist

Your ToughNet TN-4500A switch is shipped with the following items. If any of these items are missing or damaged, please contact your customer service representative for assistance.

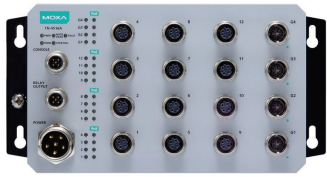
- 1 Moxa ToughNet switch
- M12-to-DB9 console port cable
- 2 protective caps for console and relay output ports
- Panel-mounting kit
- Quick installation guide (printed)
- Warranty card

Hardware Version Appearance

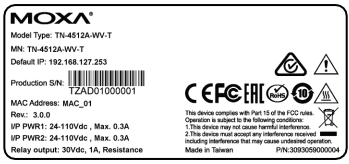
The appearance of different TN-4500A Series hardware versions may not be similar. For example, the shape and positions of LEDs on the TN-4516A hardware version 3.x are different from previous hardware versions. Secondly, the trenches on the front side are removed for hardware version 3.x. You can also refer to the device label to differentiate different device hardware versions (Rev).

Hardware version 1.x, 2.x

Hardware version 3.x



Device label on the back (non-PoE models) or side (PoE models)



Features

Anti-Vibration Circular Connectors for Robust Links

- M12 D-coded 4-pin female connectors for Fast Ethernet 10/100BaseT(X) ports
- M12 X-coded 8-pin female connectors for Gigabit Ethernet 10/100/1000BaseT(X) ports
- M12 A-coded 5-pin male connectors for console and relay outputs
- M23 6-pin male connectors for power input
- Q-ODC fiber connector for Gigabit Ethernet 1000BaseLSX with 2km multimode embedded transceiver

Isolated Power Inputs

- Supports 24 to 110 VDC (continuous voltage input from 16.8 to 137.5 VDC as stated by EN 50155)

High Performance Network Switching Technology

- IPv6 ready, certified by the IPv6 Logo Committee
- 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 from industrial Ethernet protocols
- Port-based VLAN, IEEE 802.1Q VLAN, and GVRP protocol to ease network planning
- QoS (IEEE 802.1p/1Q and ToS/DiffServ) allows real-time traffic classification and prioritization

- 802.3ad, LACP for optimum bandwidth utilization
- TACACS+, SNMPv3, IEEE 802.1X, HTTPS, and SSH to enhance network security
- SNMP v1/v2c/v3 for different levels of network management
- 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, relay output
- Automatic recovery of connected devices' IP addresses
- Line-swap fast recovery
- LLDP for automatic topology discovery through network management software
- Loop protection prevents network loops
- Configurable through web browser, Telnet/serial console, CLI, and Windows utility

Designed for Industry-Specific Applications

- Four Gigabit Ethernet ports to meet high bandwidth requirements.
- Complies with all EN 50155 mandatory test items*
- -40 to 75°C operating temperature range
- IP42 rugged high-strength case
- Panel mounting installation capability

*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

Recommended Optional Accessories

- CBL-M23(FF6P)OPEN-BK-100-IP67: 1-meter M23 to 6-pin power cable with IP67-rated female 6-pin M23 connector
- CBL-M12D(MM4P)/RJ45-100 IP67: 1-meter M12-to-RJ45 Cat-5E UTP Ethernet cable with IP67-rated male 4-pin M12 D-coded connector
- CBL-M12(FF5P)/OPEN-100 IP67: 1-meter M12-to-5-pin power cable with IP67-rated female 5-pin M12 A-coded 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
- CBL-M12DMM4PM12DMM4P-BK-100-IP67: 1-meter M12-to-M12 Cat-5E STP Ethernet cable with IP67-rated 4-pin D-coded M12 connector
- CBL-M12FF5PF9-BK-150-IP67: 1.5-meter M12-to-DB9 Cat-5E STP Ethernet cable with waterproof 5-pin D-coded M12 connector
- M12D-4PMM-IP67: M12 D-coded connector, QUICKON type, male 4-pin, IP67-rated
- M12D-4P-IP68: Field-installable M12 D-coded screw-type connector, male 4-pin, IP68-rated
- M12A-5P-IP68: Field-installable M12 A-coded screw-type connector, female 5-pin, IP68-rated

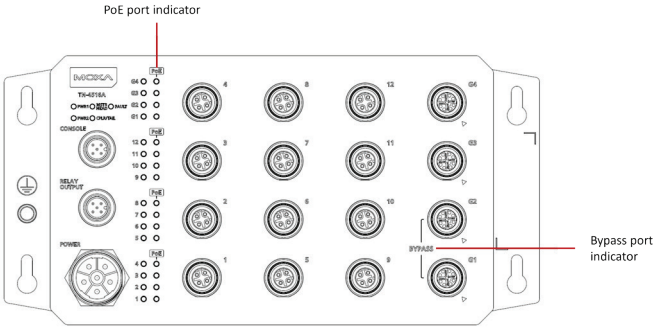
- M12X-8PMM-IP67-HTG: Field-installable M12 X-coded crimp type, slim design connector, 8-pin male, IP67-rated
- A-CAP-M12F-M-PP: Metal cap for M12 female connector
- A-CAP-M12M-M: Metal cap for M12 male connector
- A-PLG-WPM23-01-IP67: M23 cable connector, 6-pin female, crimp type
- ABC-01-M12: Configuration backup and restoration tool with M12 connector for managed Ethernet switches and wireless APs/Bridges/Clients, 0 to 60°C operating temperature

ATTENTION

The equipment is intended to be supplied by an external power source (UL listed/IEC 60950-1/IEC 62368-1), of which the output complies with ELV/ES2, LPS/PS2.
TN-4500A non-PoE models require an output rating of 24 to 110 VDC, 0.62A min., at an ambient temperature of 75°C min.
TN-4500A PoE models require an output rating of 24 to 110 VDC, 7 A min., at an ambient temperature of 75°C min.

Function Ports and Indicators

The TN-4500A Series features physical indicators for the PoE and bypass functions. Take the TN-4516A as an example, the indicators for ports that support PoE or bypass functionality will be located on the front panel of the device, as shown in the graph below.



Bypass Ports Location

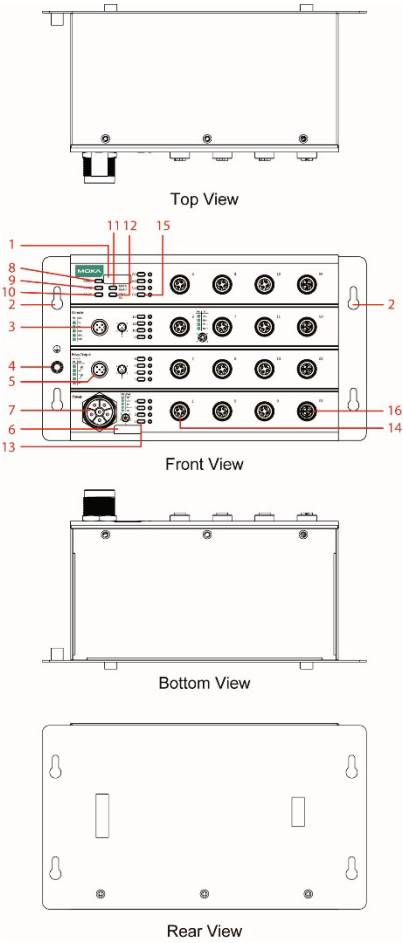
- TN-4516A models:
  4GTXBP models: Ports G1 and G2 (set 1), ports G3 and G4 (set 2)
  2GTXBP models: Ports G1 and G2
- TN-4528A models: Ports G1 and G2

PoE Ports Location

- TN-4516A PoE models: Ports 1 to 12, ports G1 to G4
- TN-4516A 2GTXBP and ODC models: Ports 1 to 12, ports G3 and G4
- TN-4520A PoE models: Ports 1 to 16, ports G1 to G4
- TN-4524A PoE models: Ports 1 to 16

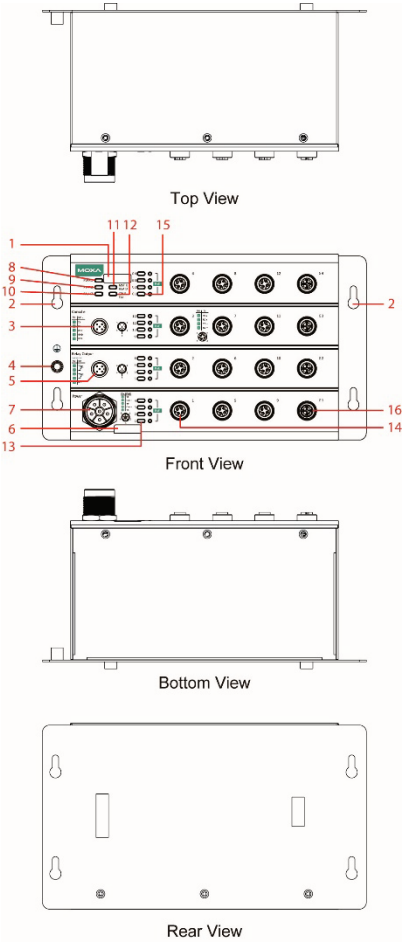
- TN-4528A PoE models: Ports 1 to 16, ports G1 to G4
- TN-4528A 2GTXBP and ODC models: Ports 1 to 16, ports G3 and G4

TN-4516A Non-PoE Models Panel Layouts



1. Model name
2. Screw holes for panel mounting kit
3. Console port
4. Grounding screw
5. Relay output port
6. Power input voltage range indicator
7. Power input port (male 6-pin shielded M23 connector)
8. PWR1 LED: for power input 1
9. PWR2 LED: for power input 2
10. FAULT LED
11. MSTR/HEAD LED: for ring master or chain head
12. CPLR/TAIL LED: for ring coupler or chain tail
13. TP port's 10/100 Mbps LED
14. 10/100BaseT(X) port (M12 D-coded 4-pin female connector)
15. Gigabit Ethernet port LED: Gigabit port's 10/100/1000 Mbps LED
16. 10/100/1000BaseT(X) port (M12 X-coded 8-pin female connector)

TN-4516A PoE Models Panel Layouts



1. Model name
2. Screw holes for panel mounting kit
3. Console port
4. Grounding screw
5. Relay output port
6. Power input voltage range indicator
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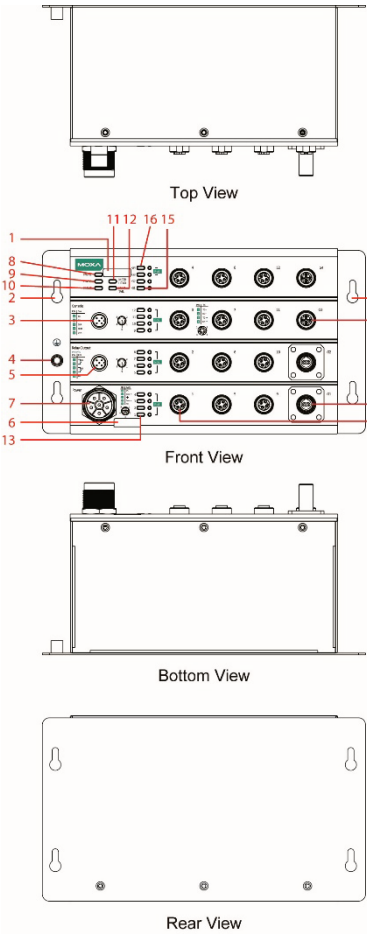
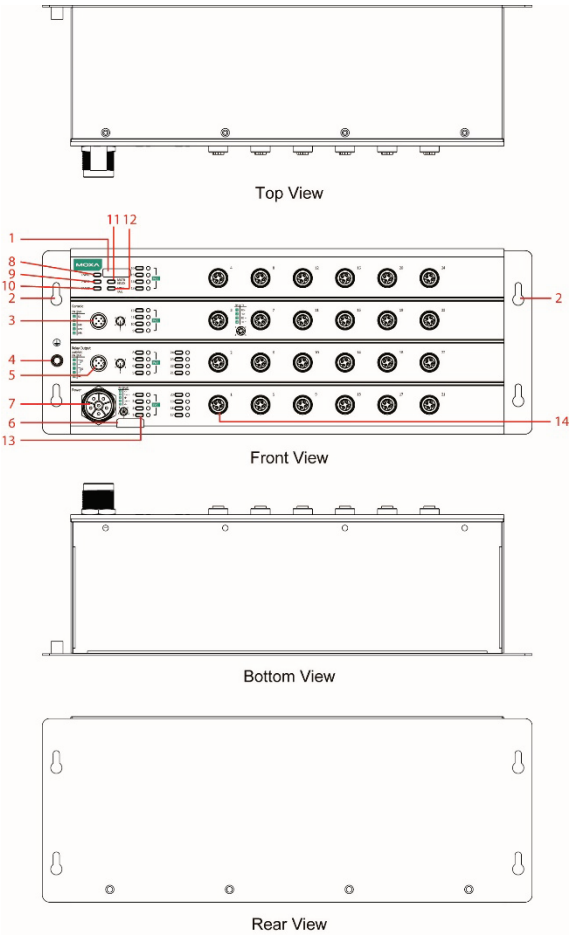
10. FAULT LED
11. MSTR/HEAD LED: for ring master or chain head
12. CPLR/TAIL LED: for ring coupler or chain tail
13. TP port's 10/100 Mbps LED
14. 10/100BaseT(X) port (M12 D-coded 4-pin female connector)
15. Gigabit Ethernet port LED: Gigabit port's 10/100/1000 Mbps LED
16. 10/100/1000BaseT(X) port (M12 X-coded 8-pin female connector)

TN-4516A Fiber Models Panel Layouts



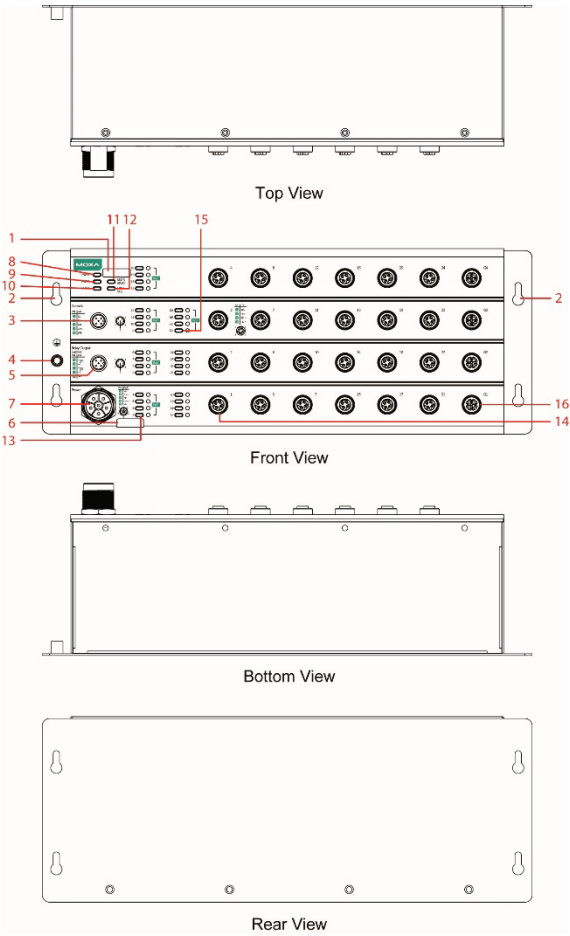
1. Model name
2. Screw holes for panel mounting kit
3. Console port
4. Grounding screw
5. Relay output port
6. Power input voltage range indicator
7. Power input port (male 6-pin shielded M23 connector)
8. PWR1 LED: for power input 1
9. PWR2 LED: for power input 2
10. FAULT LED
11. MSTR/HEAD LED: for ring master or chain head
12. CPLR/TAIL LED: for ring coupler or chain tail
13. TP port's 10/100 Mbps LED
14. 10/100BaseT(X) port (M12 D-coded 4-pin female connector)
15. Gigabit Ethernet port LED: Gigabit port's 1000 Mbps LED
16. Gigabit Ethernet port LED: Gigabit port's 10/100/1000 Mbps LED
17. 1000BaseLSX Gigabit fiber port
18. 10/100/1000BaseT(X) port (M12 X-coded 8-pin female connector)

TN-4524A PoE Models Panel Layouts



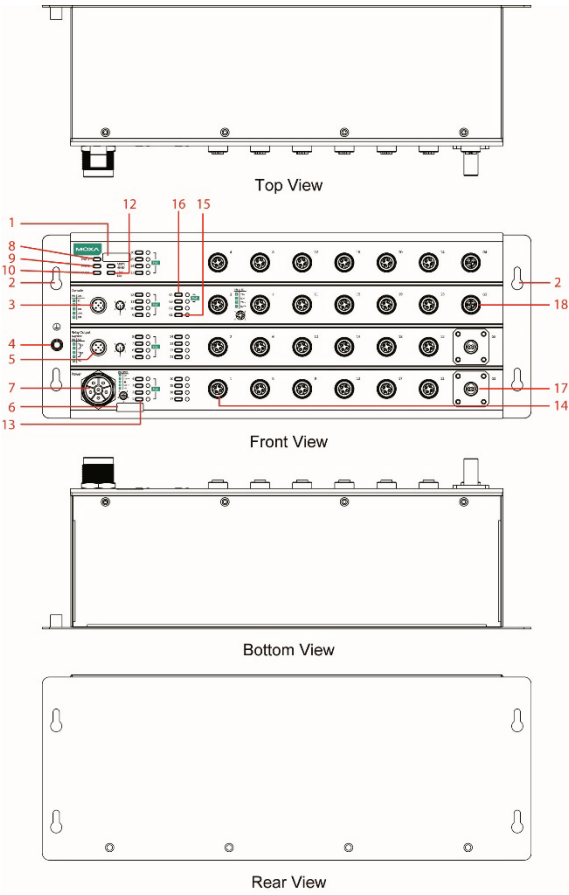
1. Model name
2. Screw holes for panel mounting kit
3. Console port
4. Grounding screw
5. Relay output port
6. Power input voltage range indicator
7. Power input port (male 6-pin shielded M23 connector)
8. PWR1 LED: for power input 1
9. PWR2 LED: for power input 2
10. FAULT LED
11. MSTR/HEAD LED: for ring master or chain head
12. CPLR/TAIL LED: for ring coupler or chain tail
13. TP port's 10/100 Mbps LED
14. 10/100BaseT(X) port (M12 D-coded 4-pin female connector)

TN-4528A PoE Models Panel Layouts



1. Model name
2. Screw holes for panel mounting kit
3. Console port
4. Grounding screw
5. Relay output port
6. Power input voltage range indicator
7. Power input port (male 6-pin shielded M23 connector)
8. PWR1 LED: for power input 1
9. PWR2 LED: for power input 2
10. FAULT LED
11. MSTR/HEAD LED: for ring master or chain head
12. CPLR/TAIL LED: for ring coupler or chain tail
13. TP port's 10/100 Mbps LED
14. 10/100BaseT(X) port (M12 D-coded 4-pin female connector)
15. Gigabit Ethernet port LED: Gigabit port's 10/100/1000 Mbps LED
16. 10/100/1000BaseT(X) port (M12 X-coded 8-pin female connector)

TN-4528A Fiber Models Panel Layouts



1. Model name
2. Screw holes for panel mounting kit
3. Console port
4. Grounding screw
5. Relay output port
6. Power input voltage range indicator
7. Power input port (male 6-pin shielded M23 connector)
8. PWR1 LED: for power input 1
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13. TP port's 10/100 Mbps LED
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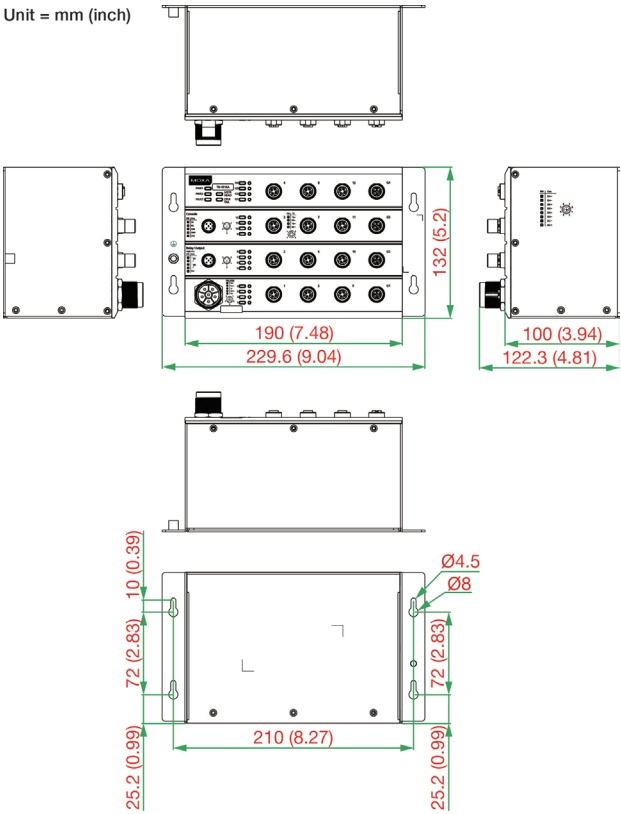
15. Gigabit Ethernet port LED: Gigabit port's 1000 Mbps LED
16. Gigabit Ethernet port LED: Gigabit port's 10/100/1000 Mbps LED
17. 1000BaseLSX Gigabit fiber port
18. 10/100/1000BaseT(X) port (M12 X-coded 8-pin female connector)

ATTENTION

Exposed connectors when not in use must be tightly covered with protective caps (an optional accessory) to ensure IP42-rated protection.

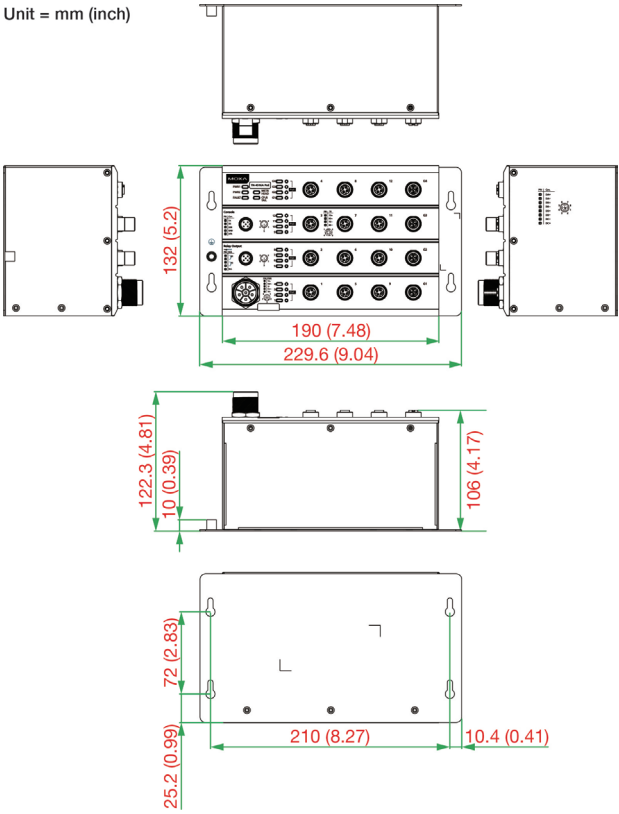
Mounting Dimensions (unit = mm)

TN-4516A Non-PoE Models



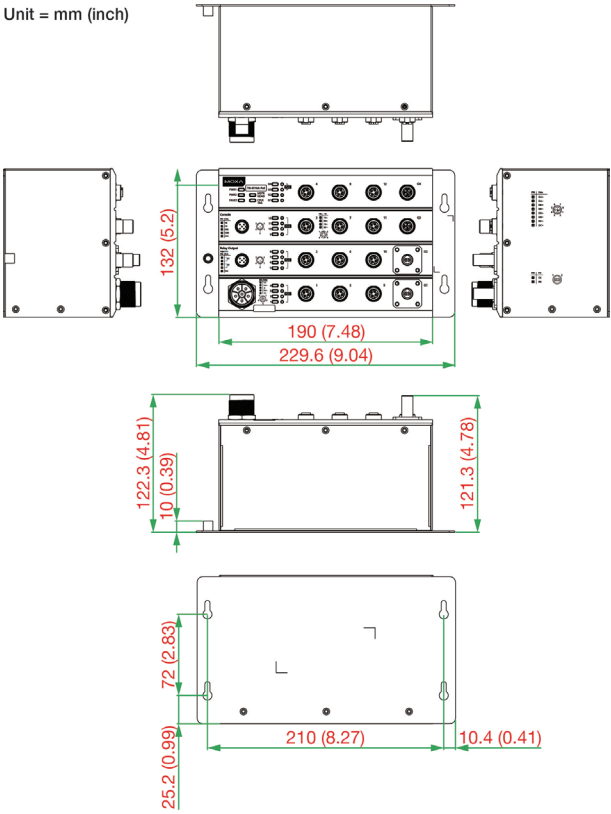
TN-4516A PoE Models

Unit = mm (inch)



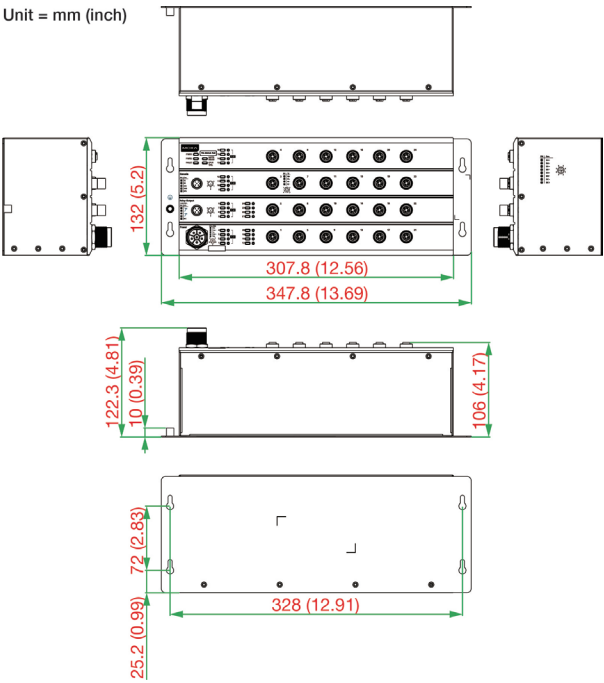
TN-4516A Fiber Models

Unit = mm (inch)



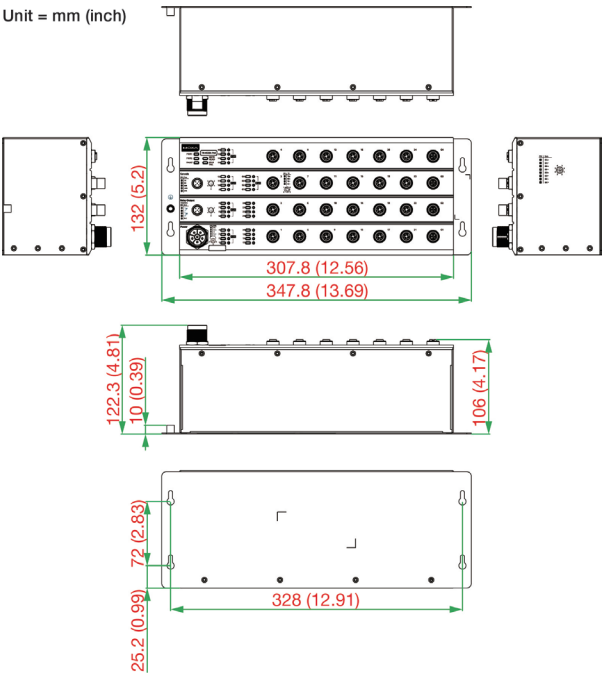
TN-4524A PoE Models

Unit = mm (inch)

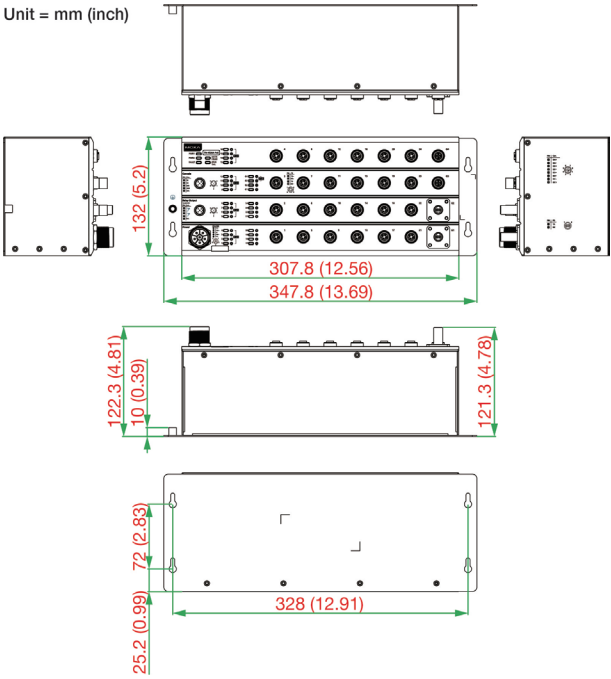


TN-4528A PoE Models

Unit = mm (inch)



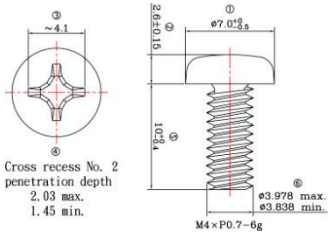
TN-4528A Fiber Models



Panel/Wall Mounting

STEP 1: Mounting the TN-4500A to a wall requires 4 screws. Use the ToughNet switch as a guide to mark the correct position of the 4 screws.

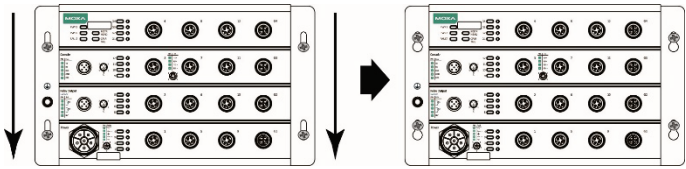
STEP 2: Use the 4 screws in the panel mounting kit. If you would like to use your own screws, make sure the screw head is **between 6.0 mm and 7.0 mm** in diameter and the shaft is less than **4.0 mm** in diameter, as shown on the right.



Do not screw the screws in all the way—leave a space of about 2 mm to allow room for sliding the ToughNet switch between the wall and the screws.

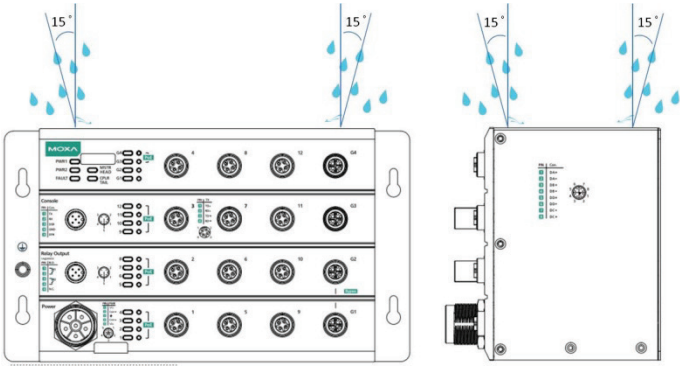
NOTE Before tightening the screws into the wall, make sure the screw head and shaft size are suitable by inserting the screw through one of the keyhole-shaped apertures of the ToughNet switch.

STEP 3: Once the screws are fixed in the wall, hang the ToughNet switch on the 4 screws using the large opening of the keyhole-shaped apertures, and then slide the switch downwards. Tighten the four screws for added stability.



NOTE To provide greater protection against vibration and shock, use screws with a shaft diameter between 6.0 mm and 7.0 mm, and fix the ToughNet switch onto the wall directly using the large opening of the keyhole-shaped apertures.

NOTE The TN-4500A Series switches have passed IP42 certification. To achieve IP42 protection, only use upright panel or wall mounting installation. Water sprayed at an angle of up to 15° degrees from the vertical will not damage the product (as indicated in the following illustration).



Wiring Requirements

WARNING

Turn the power off before disconnecting modules or wires. The correct power supply voltage is listed on the product label. Check the voltage of your power source to make sure you are using the correct voltage. Do NOT use a voltage greater than what is specified on the product label.

These devices must be supplied by a SELV source as defined in the Low Voltage Directive 2006/95/EC and 2004/108/EC.

ATTENTION

Safety First!

Be sure to disconnect the power cord before installing and/or wiring your Moxa switch. This device has UL 61010-2-201 approval. Use copper conductors only, 75°C, and tighten to 4.5 pound-inches. For use in pollution degree 2 environments.

ATTENTION

Safety First!

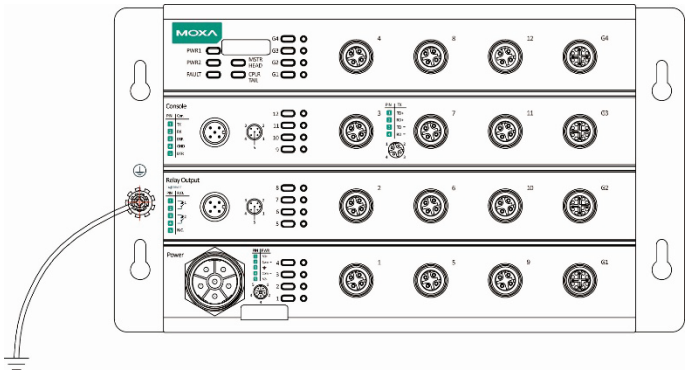
Observe all electrical codes dictating the maximum current allowable for each wire size. If the current goes above the maximum ratings, the wiring could overheat, causing serious damage to your equipment.

Please read and follow these guidelines:

- Use separate paths to route wiring for power and devices. If power wiring and device wiring paths must cross, make sure the wires are perpendicular at the intersection point.
  NOTE: Do not run signal or communications wiring and power wiring through the same wire conduit. To avoid interference, wires with different signal characteristics should be routed separately.
- You can use the type of signal transmitted through a wire to determine which wires should be kept separate. The rule of thumb is that wiring that shares similar electrical characteristics can be bundled together.
- Keep input wiring and output wiring separated.
- It is strongly advised that you label wiring for all devices in the system when necessary.

Grounding the ToughNet Switch

Grounding and wire routing help limit the effects of noise due to electromagnetic interference (EMI). Run the ground connection from the grounding screw to the grounding surface prior to connecting devices.



ATTENTION

To ground this product to earth, use a green and yellow AWG 16 or higher grounding cable.

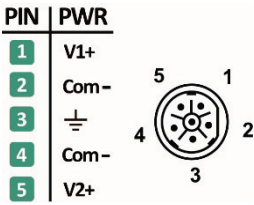
ATTENTION

This product is intended to be mounted to a well-grounded mounting surface such as a metal panel.

Connecting the Power Supplies

The ToughNet TN-4500A Series switches support dual power inputs—power input 1 and power input 2. The M23 6-pin male connector on the TN-4500A Series switches' front panel is used for the dual power inputs.

Pinouts for the power input port on the TN-4500A series



Pin	Description	Usage
1	PWR1 / DC +	Connect "PWR1 Live / DC +" to the positive (+) terminal when using a DC power source.
2	PWR1 / DC -	Connect "PWR1 Neutral / DC -" to the negative (-) terminal when using a DC power source.
3	Chassis Ground	Connect the "Chassis Ground" to the equipment ground bus for DC inputs.
4	PWR2 / DC -	Connect "PWR2 Neutral / DC -" to the negative (-) terminal when using a DC power source.
5	PWR2 / DC +	Connect "PWR2 Live / DC +" to the positive (+) terminal when using a DC power source.

STEP 1: Plug your power cord connector into the power input port of the TN-4500A switch.

STEP 2: Screw the nut on your power cord connector into the power input connector on the switch to ensure a tight connection.

ATTENTION

Before connecting the TN-4500A Series to the power input, make sure the power source voltage is stable.

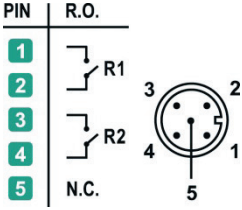
ATTENTION

Do not power on the TN-4500A Series before connecting the M23 connector.

Connecting the Relay Outputs

Each TN-4500A Series switch has two sets of relay outputs—relay output 1 and relay output 2. The M12 A-coded 5-pin male connector on the TN-4500A Series' front panel is used for the two relay outputs. Use a power cord with an M12 A-coded 5-pin female connector to connect the relay contacts. You can purchase an M12 power cable from Moxa; the model number is CBL-M12 (FF5P)/OPEN-100 IP67.

Pinouts for the relay output port on the TN-4500A series



N.C.: Not connected

FAULT:

The two sets of relay contacts of the M12 A-coded 5-pin male connector are used to detect user-configured events. The two wires attached to the fault contacts form an open circuit when a user-configured event is triggered. If a user-configured event does not occur, the fault circuit remains closed.

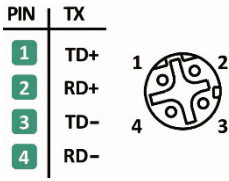
Connecting the Data Lines

10/100BaseT(X) Ethernet Port Connection

The TN-4500A Series models have two types of Ethernet ports: 10/100BaseT(X) M12 D-coded 4-pin female connectors and 10/100/1000BaseT(X) M12 X-coded 8-pin female connectors. The ports located on the TN-4500A Series front panel are used to connect to Ethernet-enabled devices. Most users configure these ports for Auto MDI/MDI-X mode, in which case the port's pinouts are adjusted automatically depending on the type of Ethernet cable used (straight-through or cross-over), and the type of device (NIC-type or HUB/Switch-type) connected to the port.

In what follows, we give pinouts for both MDI (NIC-type) ports and MDI-X (HUB/Switch-type) ports. We also give cable wiring diagrams for straight-through and cross-over Ethernet cables.

Pinouts for the 10/100BaseT(X) Ports on the TN-4500A series



Housing: shield

Pinouts for the 10/100/1000BaseT(X) M12 (8-pin) Port

PIN	Con.
1	DA +
2	DA −
3	DB +
4	DB −
5	DD +
6	DD −
7	DC −
8	DC +

PoE Pinout	D-coded	X-coded
V+	Pin 1, 3 (TD+, TD-)	Pin 1, 2 (DA+, DA-)
V-	Pin 2, 4 (RD+, RD-)	Pin 3, 4 (DB+, DB-)

Pinouts for the 1000BaseLSX Q-ODC® Gigabit Fiber port

PIN	FO
1	TX
2	RX

Connecting Procedure

Rotate to find the keying position. | Push the connector to connect. | The connector will snap in place, indicating a proper connection. | To disconnect, pull the coupling ring until disconnected.

Gigabit Ethernet Q-ODC		
Fiber Cable Type		Multi-mode
		50/125 μm
		2500 MHz*km
Typical Distance		1 km
Wavelength	Typical (nm)	1310
	TX Range (nm)	1280 to 1340
	RX Range (nm)	1100 to 1600
Optical Power	TX Range (dBm)	-5 to -15.5
	RX Range (dBm)	-3 to -23.5
	Link Budget (dB)	8
	Dispersion Penalty (dB)	6

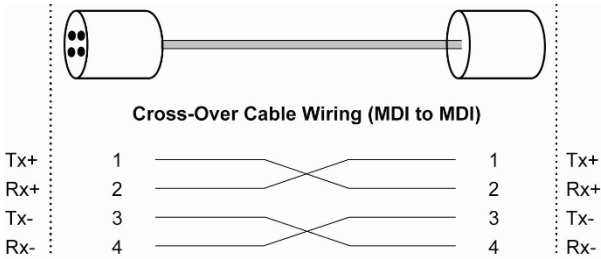
CAUTION

Use of controls, adjustments, or the performance of procedures other than those specified herein may result in hazardous radiation exposure.

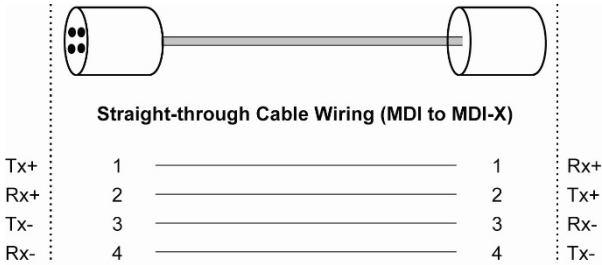
CLASS 1 LASER PRODUCT

- Complies with FDA performance standards for laser products except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019.
- Complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019.

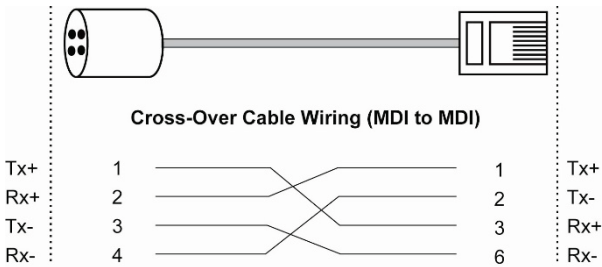
M12 (4-pin, M) to M12 (4-pin, M) Cross-over Cable Wiring



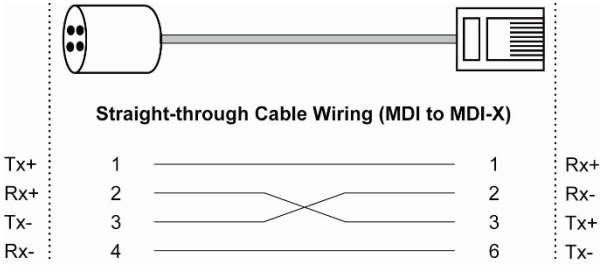
M12 (4-pin, M) to M12 (4-pin, M) Straight-through Cable Wiring



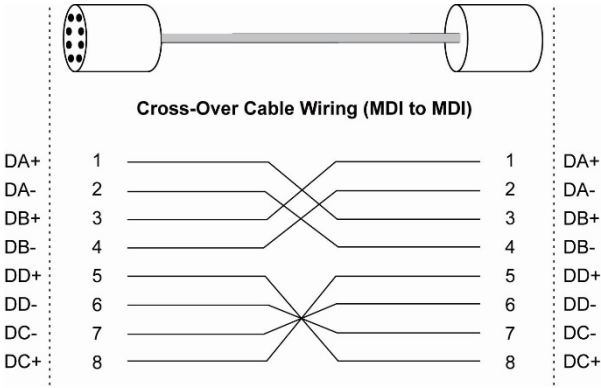
M12 (4-pin, M) to RJ45 (8-pin) Cross-Over Cable Wiring



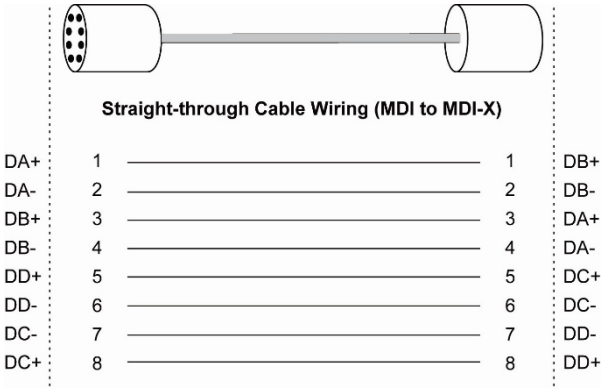
M12 (4-pin, M) to RJ45 (8-pin) Straight-through Cable Wiring



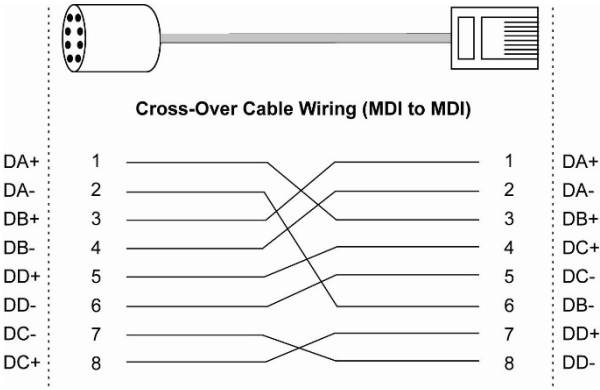
M12 (8-pin, M) to M12 (8-pin, M) Cross-over Cable Wiring



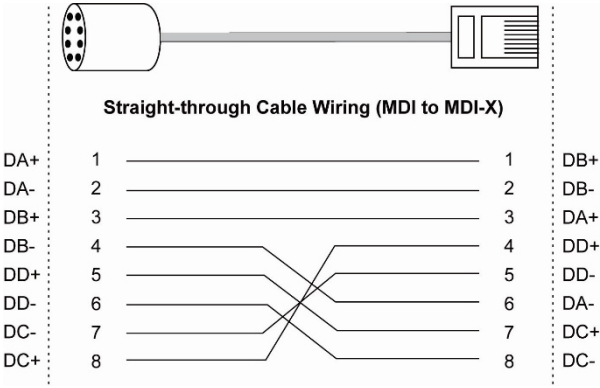
M12 (8-pin, M) to M12 (8-pin, M) Straight-through Cable Wiring



M12 (8-pin, M) to RJ45 (8-pin) Cross-over Cable Wiring



M12 (8-pin, M) to RJ45 (8-pin) Straight-through Cable Wiring



ATTENTION

The protective cover must be fixed properly to ensure IP42 protection. Use a torque wrench set to a torque of 4 kgf-m when tightening the screws. Note that applying a larger torque may damage the plastic protective cover.

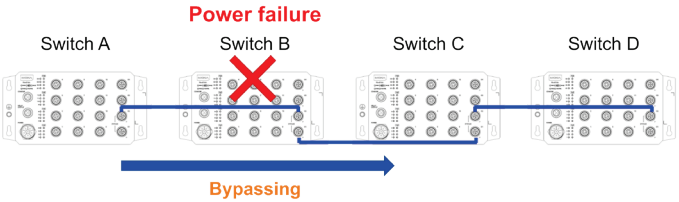
Bypass Relay Function

The TN-4516A-4GTXBP, TN-4516A-12PoE-2GPoE-2GTXBP, and TN-4528A-16PoE-2GPoE-2GTXBP models have 2 to 4 Gigabit ports equipped with bypass relay functionality. When the switch is operating normally, these Gigabit ports work in the same way as the other ports. That is, frame ingressions are processed and then forwarded. In the event the switch stops working due to a power failure, the bypass relay function will be triggered to ensure non-stop data communication.

The figure below illustrates the bypass relay function. For example, if Switch B loses power, then the Gigabit ports will be bypassed through

the relay circuit and the transmission line from Switch A to B and the transmission line from Switch B to C will interconnect automatically.

The bypass relay function helps the network recover from single-node failures in a linear topology.



With the maximum segment length of category 5 twisted-pair cable being 100 meters, cable length must be considered when designing a network that utilizes this function. For example, the total length of the cables from Switch A to B and from B to C should not exceed 100 meters. This way, if the two adjacent nodes (switch B and C for example) encounter a power failure, there will be no interruption, provided that the total length of the cables A-to-B, B-to-C, and C-to-D does not exceed 100 meters.

The bypass relay function works best for networks with linear topologies. ToughNet™ switches with bypass relay function are not recommended to be used in networks that employ ring topologies because network loops may occur when redundancy protocols such as RSTP or TurboRing™ are applied.

LED Indicators

Several LED indicators are located on the ToughNet switch's front panel. The function of each LED is described in the table below.

LED	Color	State	Description
System LEDs			
PWR1	Amber	On	Power is being supplied to power input PWR1.
		Off	Power is not being supplied to power input PWR1
PWR2	Amber	On	Power is being supplied to power input PWR2.
		Off	Power is not being supplied to power input PWR2.
FAULT	Red	On	The corresponding PORT alarm is enabled, and a user-configured event is triggered.
		Off	The corresponding PORT alarm is enabled, and a user-configured event is not triggered, or when the corresponding PORT alarm is disabled.
MSTR/ HEAD	Green	On	The TN switch is either the Master of this Turbo Ring, or the Head of this Turbo Chain.
		Blinking	The TN switch is the Ring Master of this Turbo Ring and the Turbo Ring is broken,

LED	Color	State	Description
			or it is the Chain Head of this Turbo Chain and the Turbo Chain is broken.
		Off	The TN switch is neither the Master of this Turbo Ring, nor the Head of this Turbo Chain.
CPLR/ TAIL	Green	On	The coupling function is enabled to form a back-up path in this Turbo Ring, or it is the Tail of this Turbo Chain.
		Blinking	The Turbo Chain is down.
		Off	The coupling function of Turbo Ring is disabled, or it is not the Tail of the Turbo Chain.
Port LEDs			
TP (10/ 100M)	Amber	On	The port's 10 Mbps link is active.
		Blinking	Data is being transmitted at 10 Mbps.
		Off	The port's 10 Mbps link is inactive.
	Green	On	The port's 100 Mbps link is active.
		Blinking	Data is being transmitted at 100 Mbps.
		Off	The port's 100 Mbps link is inactive.
PoE Ports	Amber	On	Power is being supplied to a Powered Device (PD)
		Off	Power is not being supplied to a Powered Device (PD)
G1 to G4 (10/100/ 1000M, for copper ports)	Amber	On	The port's 10 or 100 Mbps link is active.
		Blinking	Data is being transmitted at 10 or 100 Mbps.
		Off	The port's 10 or 100 Mbps link is inactive.
	Green	On	The port's 1000 Mbps link is active.
		Blinking	Data is being transmitted at 1000 Mbps.
		Off	The port's 1000 Mbps link is inactive.
G1/G2 (1000M, for fiber ports)	Green	On	The port's 1000 Mbps link is active.
		Blinking	Data is being transmitted at 1000 Mbps.
		Off	The port's 1000 Mbps link is inactive.