

TN-4900 Series Quick Installation Guide

Moxa ToughNet Router

Version 1.1, November 2022

Technical Support Contact Information
www.moxa.com/support



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P/N: 1802049080011



Overview

The ToughNet TN-4900 Series is designed for rolling stock Ethernet networks. These routers feature M12 interfaces to ensure tight, robust connections, and guarantee reliable operation in industrial environments where vibration and shock are commonplace. The TN-4900 Series routers are equipped with 8 Gigabit ports and up to 4 bypass relay ports. In addition, the PoE models in this Series have 4 IEEE 802.3at/af PoE Gigabit ports while the 16-port models have 8 PoE-capable Fast Ethernet ports.

These routers also feature firewall, ETBN, routing functionality, and a broad power input range of 24 to 110 VDC to facilitate different applications across networks. The -40 to 70°C wide temperature range allows the TN-4900 Series to operate in demanding environmental conditions for extended periods of time. Furthermore, these routers are compliant with the mandatory requirements of EN 50155, making them suitable for a variety of industrial applications.

Package Checklist

Your ToughNet TN-4900 router is shipped with the following items. If any of these items are missing or damaged, please contact your customer service representative for assistance.

- TN-4900 Series router
- Protective caps for the console port (x1), Ethernet ports (TN-4908: x4, TN-4916: x8), and USB storage port (x1)
- Panel mounting kit
- Quick installation guide (printed)
- Warranty card

Features

Anti-vibration Push-Pull/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 B-coded 5-pin female connector for serial console port
- M12 A-coded 5-pin female connector for USB storage port
- M12 K-coded 5-pin male connector for power input

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

- Provides up to 30 watts per PoE port with a total power budget of 50 watts per router for TN-4908 PoE models and 95 watts per router for TN-4916 PoE models
- IPv6 Ready logo awarded (IPv6 Logo Committee certified)
- DHCP Option 82 for IP address assignment with different policies
- Turbo Ring and Turbo Chain (recovery time < 50 ms @ 250 routers), 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
- SNMPv1/v2c/v3 for different levels of network management
- RADIUS, 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
- Port mirroring for online debugging
- Automatic warning by exception through email
- Line-swap fast recovery
- LLDP for automatic topology discovery in network management software
- Configurable by web browser, Telnet/serial console, CLI, and Windows utility

Designed for Industry-Specific Applications

- Eight Gigabit Ethernet ports to meet high bandwidth requirements.
- Complies with all EN 50155 mandatory test items*
- -40 to 70°C operating temperature range
- IP40-rated 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-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
- 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 push-pull 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
- M12D-4P-IP68: Field-installable M12 D-coded screw-type connector, male 4-pin, IP68-rated



ATTENTION

The equipment is intended to be supplied by an external power source (UL listed/IEC 60950-1/IEC 62368-1). TN-4908 PoE models require an output rating of 24 to 110 VDC, 3.6 A min., at an ambient temperature of min. 70°C. TN-4916 PoE models require an output rating of 24 to 110 VDC, 5.9 A min., at an ambient temperature of min. 70°C.



ATTENTION

Restricted Access Location

This equipment is intended to be used in restricted access locations, such as control rooms. Access should be restricted to qualified service personnel or authorized users.

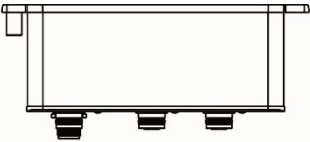


ATTENTION (For PoE Models)

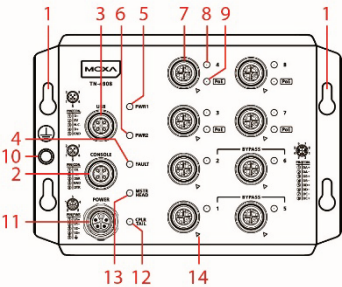
For safety reasons, it is not recommended to connect the device to a network with routing to external networks.

Panel Layouts

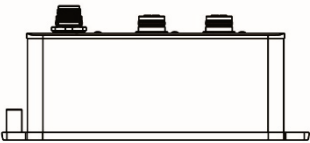
TN-4908 Models



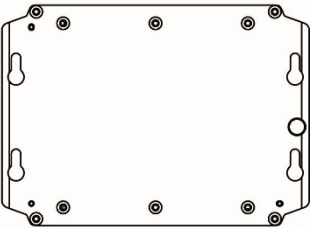
Top View



Front View



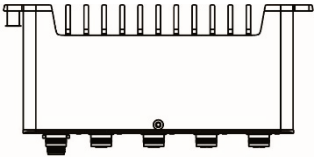
Bottom View



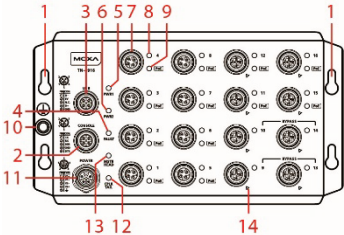
Rear View

1. Screw holes for panel mounting kit
2. Console port
3. USB port
4. FAULT LED
5. PWR1 LED:
for power input 1
6. PWR2 LED:
for power input 2
7. 10/100/1000BaseT(X)
port (M12 X-coded 8-pin
female connector)
8. 10/100/1000BaseT(X)
port LED
9. PoE LED
10. Grounding screw
11. Power input port (M12 K-
coded 5-pin male
connector)
12. CPLR/TAIL LED: for ring
coupler or chain tail
13. MSTR/HEAD LED: for ring
master or chain head
14. Alignment mark for X-
coded connector

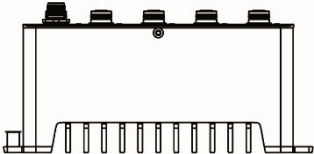
TN-4916 Models



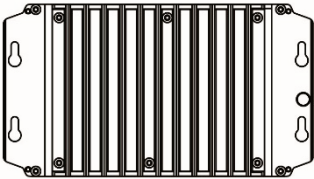
Top View



Front View



Bottom View



Rear View

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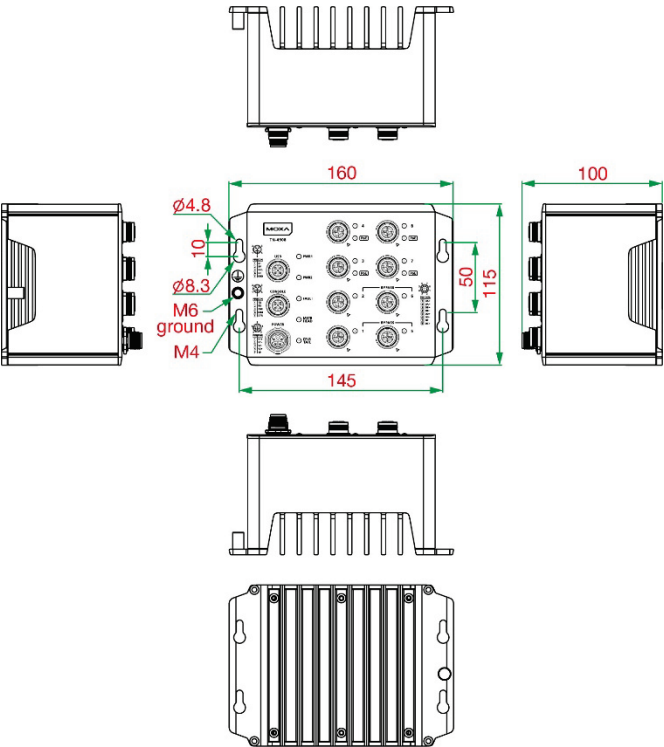


ATTENTION

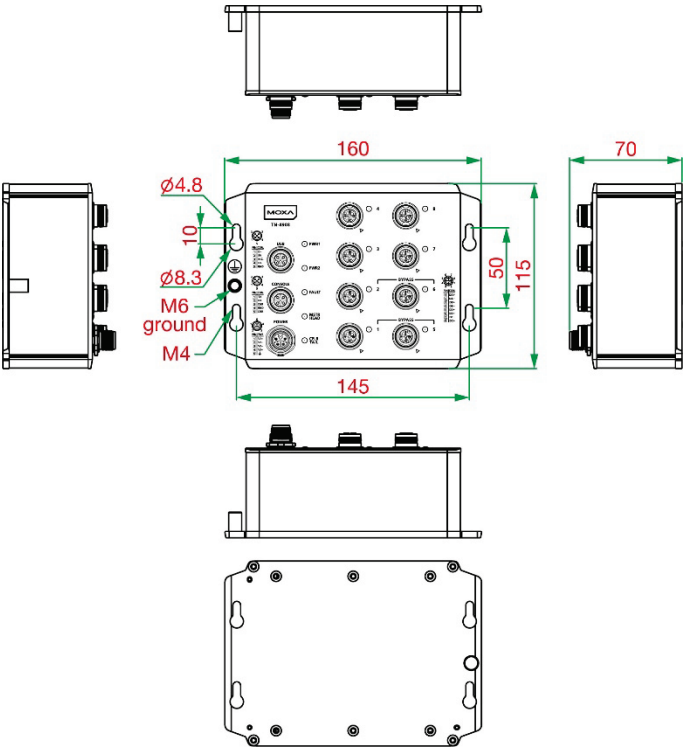
Exposed connectors when not in use must be tightly covered with protective caps (an optional accessory) to ensure IP67-rated protection.

Mounting Dimensions (unit = mm)

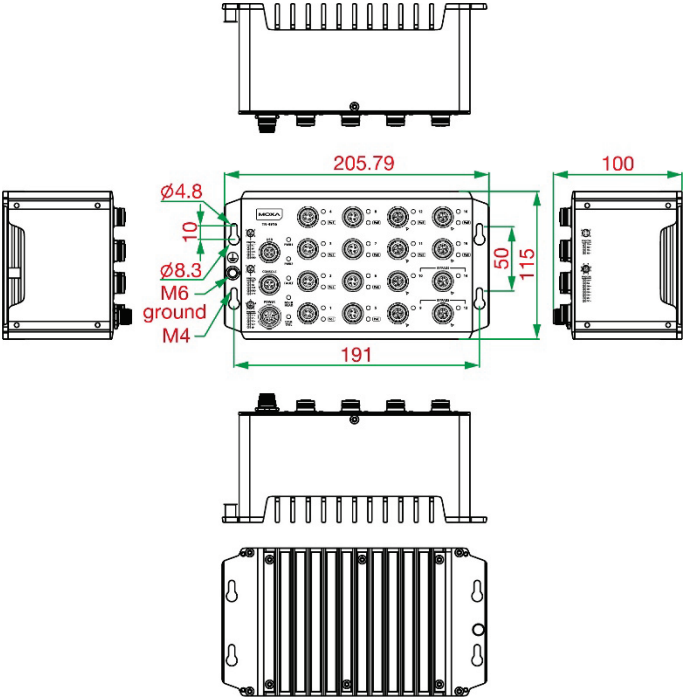
TN-4908 PoE Models



TN-4908 Non-PoE Models



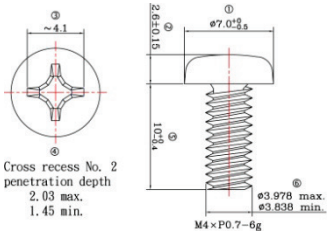
TN-4916 PoE Models



Panel/Wall Mounting

STEP 1: Mounting the TN-4900 to a wall requires 4 screws. Use the ToughNet router as a guide to mark the correct positions of the 4 screws.

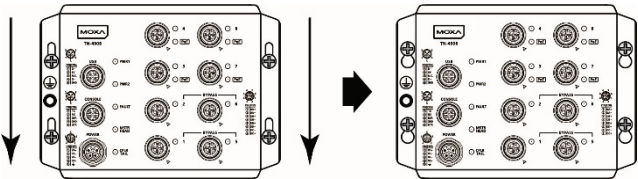
STEP 2: Use the 4 screws in the panel mounting kit. If you would like to use your own screws, make sure the screw head is **between 6.0 mm and 7.0 mm** in diameter and the shaft is less than **4.0 mm** in diameter, as shown at the right. The torque value of the mounting screws is 4.5 kgf-cm.



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

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



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

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 router. This device has UL 61010-2-201 approval. Use copper conductors only, 70°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:

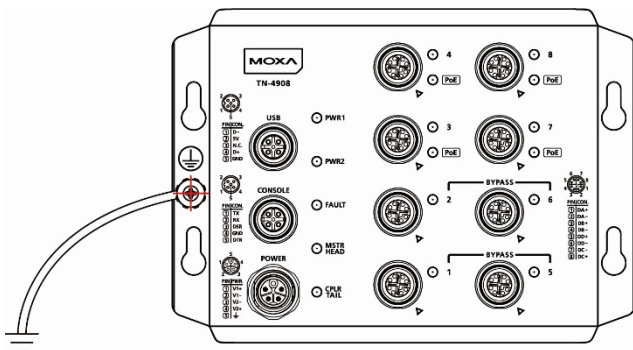
- Use separate paths to route wiring for power and devices. If power wiring and device wiring paths must cross, make sure the wires are perpendicular at the intersection point.

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 Router

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 18 or higher grounding cable.



ATTENTION

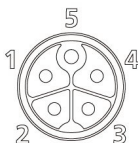
This product is intended to be mounted to a well-grounded mounting surface such as a metal panel.

Connecting the Power Supplies

The ToughNet TN-4900 Series routers support dual power inputs—power input 1 and power input 2. The M12 K-coded 5-pin male connector on the TN-4900 Series routers' front panel is used for the dual power inputs.

Pinouts for the power input port

PIN	PWR
1	V1+
2	V1-
3	V2-
4	V2+
5	GND



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

STEP 1: Plug your power cord connector into the power input port of the TN-4900 router.

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



ATTENTION

Before connecting the TN-4900 series to the power input, make sure the power source voltage is stable.



ATTENTION

Do not power on the TN-4900 Series before connecting the M12 power connector.

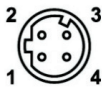
Connecting the Data Lines

10/100BaseT(X) Ethernet Port Connection

All TN-4916 models have 8 10/100BaseT(X) Ethernet ports (4-pin shielded M12 connector with D coding). The 10/100TX ports located on the TN-4916 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/Router-type) connected to the port. In what follows, we give pinouts for both MDI (NIC-type) ports and MDI-X (HUB/Switch/Router-type) ports. We also give cable wiring diagrams for straight-through and cross-over Ethernet cables.

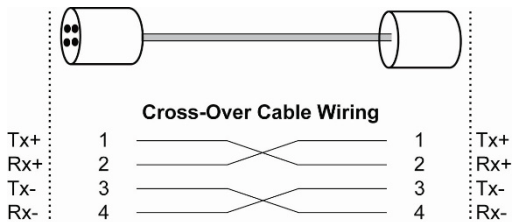
Pinouts for the 10/100BaseT(X) Ports

PIN	TX
1	TD+
2	RD+
3	TD-
4	RD-

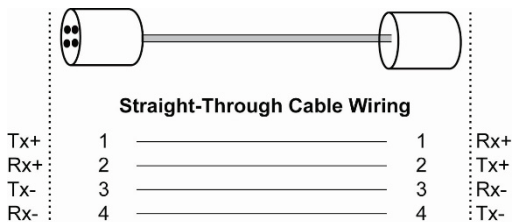


Housing: shield

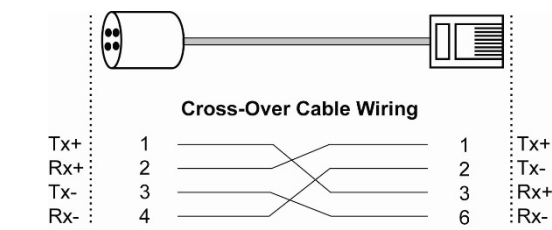
M12 (4-pin, M) to M12 (4-pin, M) Cross-Over Cable Wiring



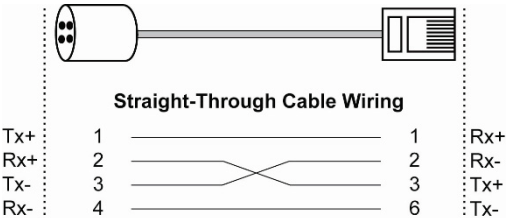
M12 (4-pin, M) to M12 (4-pin, M) Straight-Through Cable Wiring



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



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



10/100/1000BaseT(X) Ethernet Port Connection

The TN-4900 Series has 8 10/100/1000BaseT(X) Ethernet ports (M12 X-coded 8-pin female connector). The 10/100/1000TX ports located on the front panel of the TN-4900 Series 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/Router-type) connected to the port.

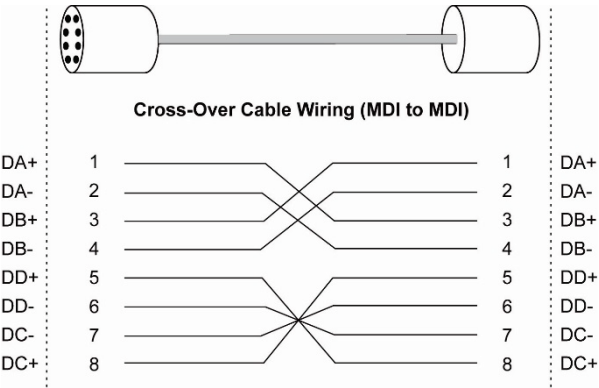
In what follows, we give pinouts for both MDI (NIC-type) ports and MDI-X (HUB/Switch/Router-type) ports. We also give cable wiring diagrams for straight-through and cross-over Ethernet cables.

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

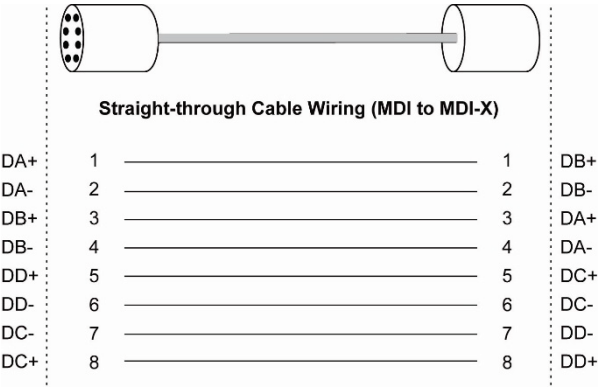
PIN	Con.
1	DA +
2	DA -
3	DB +
4	DB -
5	DD +
6	DD -
7	DC -
8	DC +



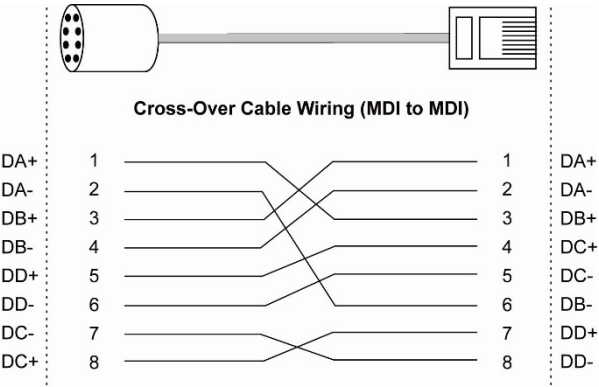
M12 (8-pin, M) to M12 (8-pin, M) Cross-Over Cable Wiring



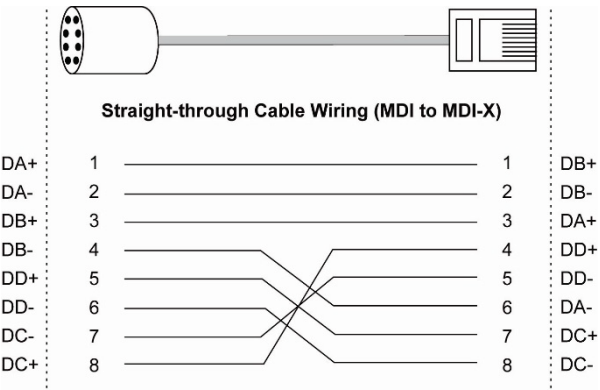
M12 (8-pin, M) to M12 (8-pin, M) Straight-Trough Cable Wiring



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



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



ATTENTION

Use a torque wrench set to a torque of 4.5 kgf-m when tightening the screws. Note that applying a larger torque may damage the protective cover.

LED Indicators

Several LED indicators are located on the ToughNet router’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	When a user-configured event is triggered. 1. Turbo Ring is broken 2. Port link turned on or off Note: The FAULT LED will be on during the DUT boot up state and while waiting for the system to be ready. Once the system is ready, the FAULT LED will turn off.
		Off	When the corresponding PORT alarm is enabled and a user-configured event is not triggered, or when the corresponding PORT alarm is disabled.

LED	Color	State	Description
MSTR/ HEAD	Green	On	When the TN router is either the Master of this Turbo Ring, or the Head of this Turbo Chain.
		Blinking	When the TN router is Ring Master of this Turbo Ring and the Turbo Ring is broken, or it is the Chain Head of this Turbo Chain and the Turbo Chain is broken.
		Off	When the TN router is neither the Master of this Turbo Ring, nor the Head of this Turbo Chain.
CPLR/ TAIL	Green	On	When the TN router enables the coupling function to form a back-up path in this Turbo Ring, or it is the Tail of this Turbo Chain.
		Blinking	When Turbo Chain is down.
		Off	When the TN router disables the coupling function of Turbo Ring, or it is not the Tail of the Turbo Chain.
FAULT + MSTR/HEAD + CPLR/TAIL	Rotate Blinking Sequentially		When ABC-02 is importing or exporting files.

LED	Color	State	Description
Port LEDs			
FE Ports (10/100M for copper ports)	Amber	On	FE port's 10 Mbps link is active.
		Blinking	Data is being transmitted at 10 Mbps.
		off	FE port's 10 Mbps link is inactive.
	Green	On	FE port's 100 Mbps link is active.
		Blinking	Data is being transmitted at 100 Mbps.
		off	FE port's 100 Mbps link is inactive.
GB Ports (10/100/ 1000M, for copper ports)	Amber	On	TP port's 10 or 100 Mbps link is active.
		Blinking	Data is being transmitted at 10 or 100 Mbps.
		Off	TP port's 10 or 100 Mbps link is inactive.
	Green	On	TP port's 1000 Mbps link is active.
		Blinking	Data is being transmitted at 1000 Mbps.
		Off	TP port's 1000 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).