

# MobiRake Wi20

## Vehicle Unit

### Quick Installation Guide

Version 2.0.1



*Hypercable*  
MobiRake

Feb. 2013

## WARNINGS



In order to comply with international radio frequency (RF) exposure limits, dish antennas should be laced at a minimum of 8.7 inches (22 cm) from the bodies of all persons. Other antennas should be laced a minimum of 7.9 inches (20 cm) from the bodies of all persons.

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Ultimate disposal of this product should be handled according to all national laws and regulations.

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Do not locate the antenna near overhead power lines or other electric light or power circuits, or where it can come into contact with such circuits. When installing the antenna, take extreme care not to come into contact with such circuits, as they may cause serious injury or death. For proper installation and grounding of the antenna, please refer to national and local codes.

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Only trained and qualified personnel should be allowed to install, replace, or service this equipment.

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To meet regulatory restrictions, the Vehicle Unit and the external antenna must be professionally installed. The network administrator or other IT professional responsible for installing and configuring the Vehicle Unit is a suitable professional installer. Following installation, access to the Vehicle Unit should be password protected by the network administrator to maintain regulatory compliance.

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Follow the guidelines in this installation guide to ensure correct operation and safe use of the Vehicle Unit.

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## ■ PACKAGE CONTENTS

The package you have received should contain the following items:

- Vehicle unit .....x1
- Product CD.....x1
- Quick Installation Guide.....x1

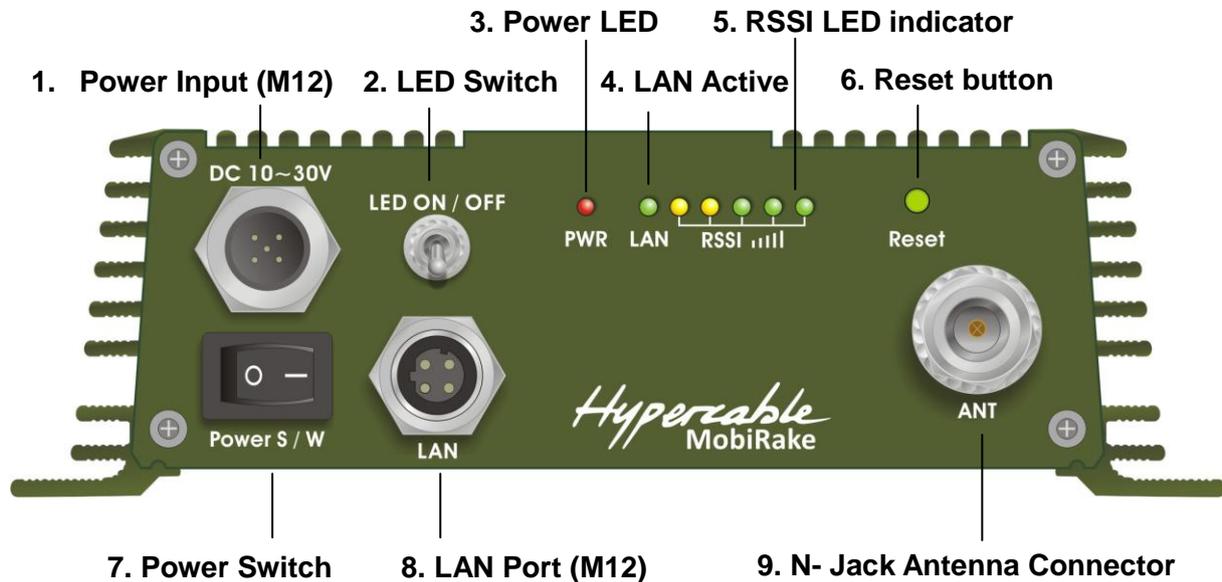


**If any item on the above list is not included or damaged, please contact your local vendor for support.**

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## MECHANICAL DESCRIPTION

Please refer to the following table for the meaning of each feature.

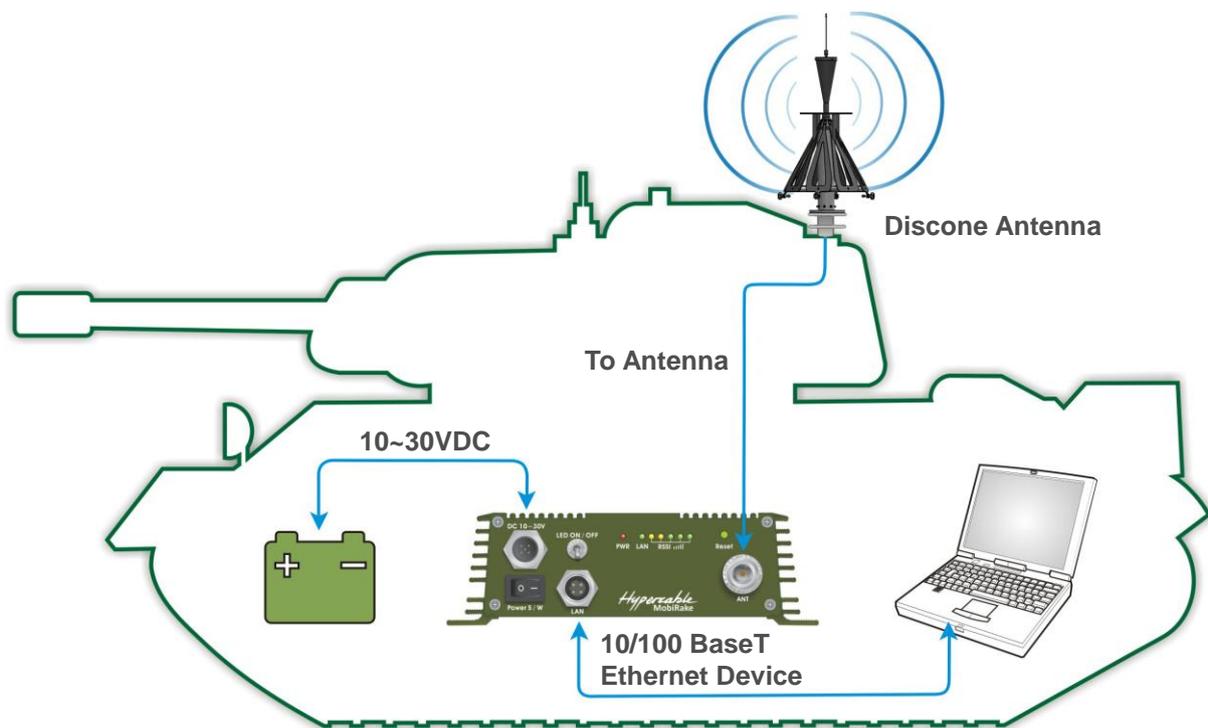


Vehicle Subscriber Unit Figure

1	<b>Power Input (M12)</b>	Feed 10~30VDC power to the Vehicle Unit via this power Jack, please follow the pin assignment for correct + / - polarity, mix that might cause the damage of radio.
2	<b>LED Switch</b>	Switch up: Turn on the LED indicators Switch down: Turn off the LED indicators
3	<b>Power LED</b>	Indicate status of power on or off.
4	<b>LAN Active LED</b>	Indicate status of LAN active
5	<b>RSSI LED indicator</b>	This function only works at CPE mode to indicate the RSSI from Basestation, 5 LEDs (levels) totally, more LEDs means stronger signal level.
6	<b>Reset button</b>	press it and hold the reset button for 5~10 seconds, the Vehicle Unit will back to factory default settings.
7	<b>Power Switch</b>	○: OFF / —: ON
8	<b>LAN Port (M12)</b>	Use the SFTP cat.5 cable with M12 connector to connect to the Vehicle Unit, and the other end to other Ethernet device such as PC or switch / router.
9	<b>N- Jack Antenna Connector</b>	Here you can attach the proper antenna with the Vehicle unit to wirelessly connect to the networks. In order to improve the RF signal radiation of your antenna, proper antenna installation is necessary. (VSWR less than 1.5)

## ■ INSTALL THE Vehicle Subscriber Unit

This section show you how to mount the Vehicle unit, please read it carefully before you start to install the hardware. Be safe and step by step to finish the hardware installation.



Hardware Installation Figure



This vehicle unit can be damaged by incorrect power application. Read and follow the installation instructions carefully before connecting the system to its power source.

### 1. Mounting the vehicle unit in the car



Only trained and qualified personnel should be allowed to install, replace, or service this equipment.



## ATTENTION

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

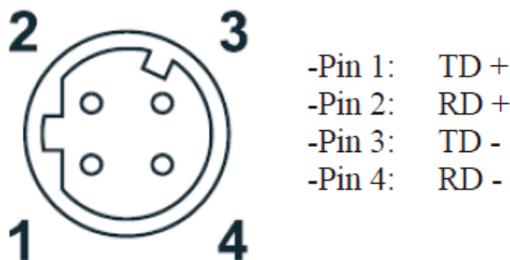
The – VDC is grounded to the vehicle and antenna coaxial cable is grounded to the vehicle

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## 2. Connect the LAN Port (M12 connector)

This Vehicle Unit support 10/100M Ethernet connection. Attach your SFTP cat.5 Ethernet cable with the M12 connector on the Vehicle Unit, and then connect the other end of the cable to the other Ethernet devices. Please follow the below pinouts assignment for the Ethernet cable.

### TP Port



## 3. Attached the antenna

Users can attach the proper antenna to the N-type connector on the Vehicle Unit.



**To meet regulatory restrictions, the Vehicle Unit and the external antenna must be professionally installed. ( Grounded and with VSWR less than 1.5)**

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## 4. Connect the Power Cable

Use the M12 connector to make a DC power cable to connect the Vehicle Unit and Vehicle power supply. Feed in proper voltage range DC (10~30VDC) to the Vehicle Unit with correct polarity to make sure the Vehicle Unit works well. Please refer to below pinouts assignment for correct + / - polarity, mix that might cause damage to the Vehicle Unit.

Model (Indoor / Vehicle)	DC input range	Power consumption
873 MHz 5W	10~30V DC	Main board + RF module (Max. 16.8W)

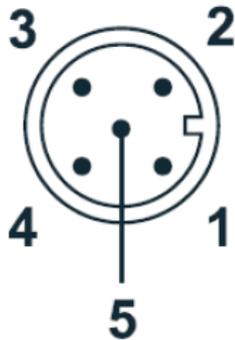
MobiRake Vehicle Unit	12VDC	24VDC
Pure Tx mode	1.4A	0.75A
Pure Rx mode	1.2A	0.6A

Power cable	AWG Number	MAX current *
MOXA	21 AWG (0.723mm)	1.2~1.6A
Hypercable	20 AWG (0.812mm)	1.5~2A

Modèle (Extérieur POE)	Tension d'alimentation	Puissance consommée
800MHz 5W	15~35V DC	Carte mère et module radio (Max. 16.8W) + chauffage (12W)
400MHz 5W	15~35V DC	Carte mère et module radio (Max. 13.8W) + chauffage(12W)
2.4GHz / 5GHz 0.2W	15~35V DC	Carte mère et module radio (Max. 8W) + chauffage (12W)

Modèle (intérieur et véhicule)	Tension d'alimentation	Puissance consommée
800MHz 5W	10~30V DC	Carte mère et module radio (Max. 16.8W)
400MHz 5W	10~30V DC	Carte mère et module radio (Max. 13.8W)
2.4GHz / 5GHz 0.2W	10~30V DC	Carte mère et module radio (Max. 8W)

**Power input**



- Pin 1: Input V+
- Pin 2: Not assigned
- Pin 3: Not assigned
- Pin 4: Not assigned
- Pin 5: Function ground

- Pin 1: Brown – marron + VDC
- Pin3: Blue –Bleu –VDC (for Moxa switch)
- Pin 5: Green –Vert Masse et – VDC for MobiRake

**5. Align the antenna by the Bar Led or the beeper**

This function only works at CPE mode to indicate the RSSI from Basestation, 5 LEDs (levels) totally, more LEDs means stronger signal level.

During the base station research, the Barled display a led scan mode.

You can hear different tempo of beeper in different signal strength , there are 5 signal levels totally, please refer to the following list.

Signal level	1(Min)	2	3	4	5(Max)
<b>RSSI</b>	-92~-88dBm	-87~-78dBm	-77~-63dBm	-62~-43dBm	-42~+10dBm
<b>LED Status</b>	1* Yellow	2 * Yellow	2 * Yellow + 1 * green	2 * Yellow + 2 * green	2 * Yellow + 3 *green



**You should read and follow the installation instructions carefully before connecting the system to its power source. This wireless Vehicle Unit can be damaged by incorrect power supply.**

**Moxa ToughNet Switch**

**TN-5305 Series**

**Layer 2 M12/IP67 unmanaged Ethernet switches Hardware Installation Guide**

## Overview

The Moxa ToughNet TN-5305 series of 5-port smart Ethernet switches provides a hardened and cost-effective solution for your Ethernet connections.

The TN-5305 switches are IP67-rated to provide protection against shock and foreign particles. IP67-rated products have the following characteristics: (1) dust proof, (2) protection against the effects of temporary immersion in water.

The TN-5305 switches have a wide operating temperature range of -40 to 75°C, and are designed to withstand a high degree of vibration and shock. The rugged hardware design makes the TN-5305 switches perfect for ensuring that your Ethernet equipment can withstand the rigors associated with critical industrial applications. The switches are rated for use in hazardous locations (Class 1 Division 2/Zone 2), and comply with CE/FCC, UL, DNV/GL/ABS/LR/NKK (maritime), and EN50155/50121-4 (railway applications) standards.

## Package Checklist

Your TN-5305 is shipped with the following items. If any of these items is missing or damaged, please contact your customer service representative for assistance.

- Moxa ToughNet Switch.
- Hardware Installation Guide.
- Product Warranty Statement.
- 3 protective caps for unused ports and 8 port labels.
- Panel Mounting Kit.

## Features

### *High Performance Network Switching Technology*

- 5 10/100BaseT(X) ports (4-pin shielded M12 socket with D coding).
- Broadcast storm protection.
- IEEE802.3/802.3u/802.3x.
- Store and Forward switching process type.
- 10/100M, Full/Half-Duplex, MDI/MDIX auto-sensing.

### *Industrial Grade Reliability*

- Active circuit protection.
- Robust connection.
- Dust and immersion proof.

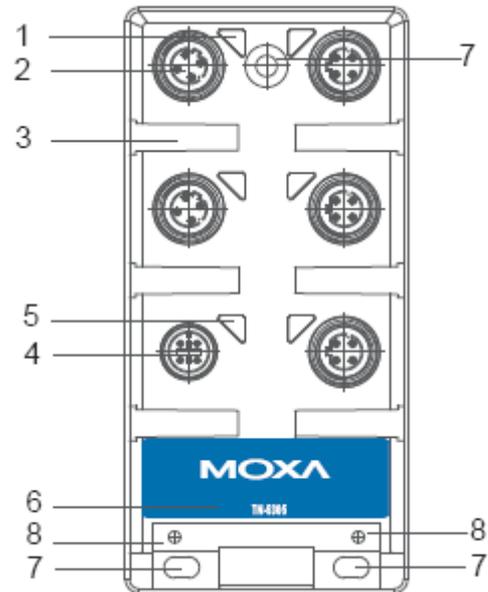
### *Rugged Design*

- Casing design meets IP67 protection standards.
- M12 connectors for robust connections.
- Operating temperature range of 0 to 60°C, or extended operating temperature range of -40 to 75°C.

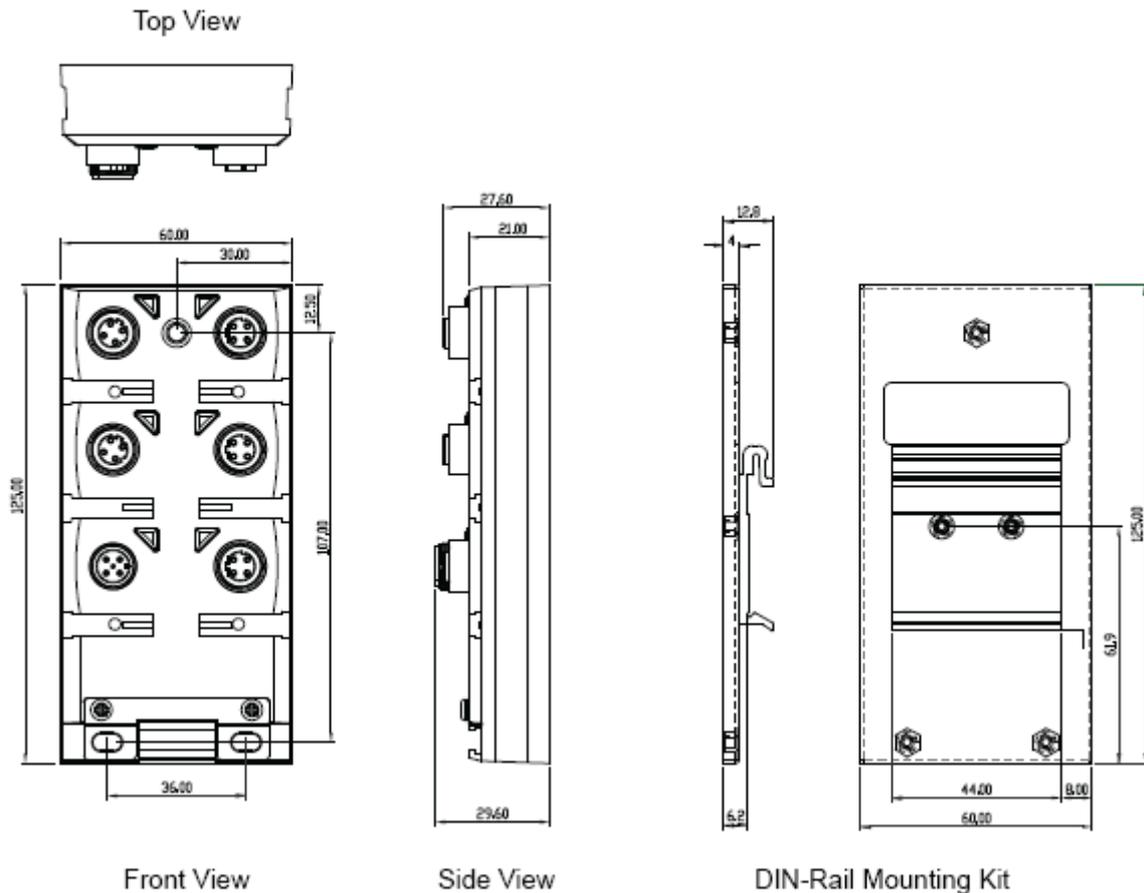
## TN-5305 Panel Layouts

### Front Panel View

1. M12 port's 10/100 Mbps LED.
2. 10/100BaseT(X) port (4-pin female shielded M12 socket with D coding).
3. Port Label.
4. Power input (5-pin male shielded M12 socket with A coding).
5. Power input (PWR) LED.
6. Model name.
7. Holes for attaching the TN-5305 to a wall with screws (there are 3 holes: bottom left, bottom right, and top middle).
8. Grounding screws.



### Mounting Dimensions (unit = mm)



## Panel/Wall Mounting

To mount the TN-5305 on the wall use the 3 screws included in the panel mounting kit.

**STEP 1:** Make 3 screw holes on the wall based on the positions of the 3 screw holes on the switch shown in the mounting dimensions diagram.

**STEP 2:** Insert one screw in the top-middle screw hole on the switch and screw it into the wall.

**STEP 3:** Screw in the remaining 2 screws through the bottom-left and bottom-right holes on the switch.

## DIN-Rail Mounting (optional)

Use the optional DIN-Rail mounting kit (DK-M12-305, must be purchased separately) to mount the TN-5305 on a 35-mm DIN rail.

### STEP 1:

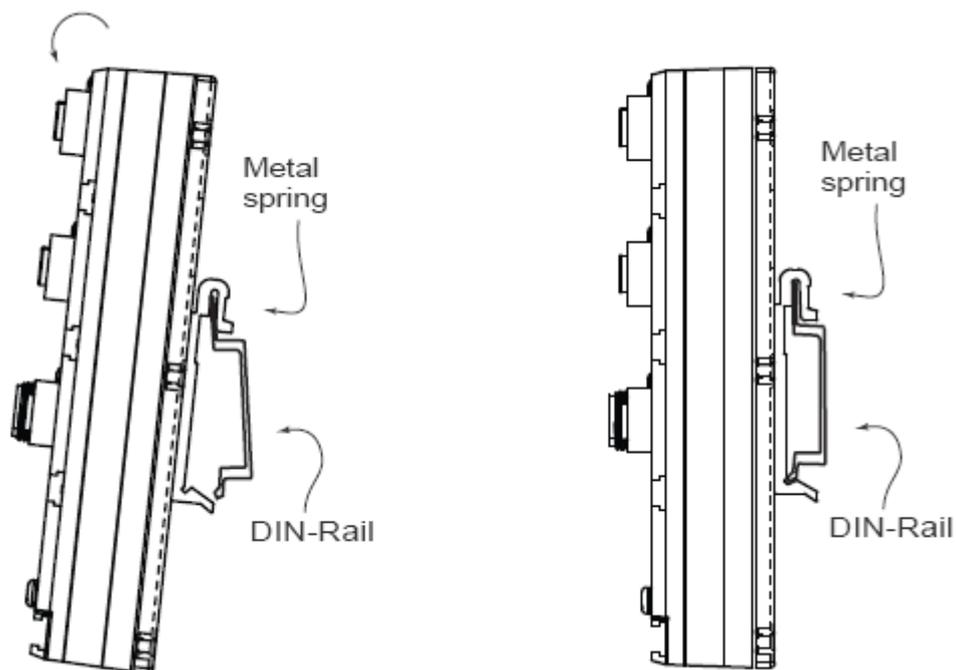
Fix the DIN-Rail attachment plate to the rear panel of the switch as shown in the above figure.

### STEP 2:

Position the top hook of the DIN-Rail attachment plate to the top edge of the rail.

### STEP 3:

Rotate the switch downwards until the bottom of the attachment plate latches onto the bottom edge of the rail.



To remove the switch from the DIN-Rail, simply reverse Steps 2 and 3 above.



## 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 that 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 UL508 approval. Use copper conductors only, 60/75°C, Tighten To 4.5 pound-inches. For use in Pollution Degree 2 Environment.



## ATTENTION

### Safety First!

Calculate the maximum possible current in each power wire and common wire. 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.

You should also heed the following guidelines:

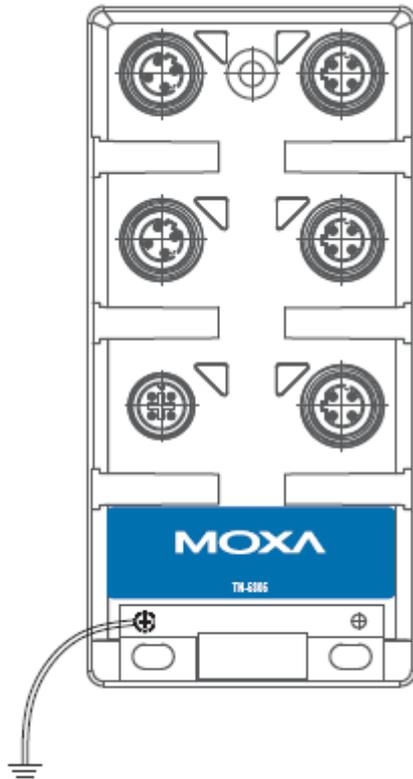
- Use separate paths to route wiring for power and devices. If power wiring and device wiring paths must cross, make sure the wires are perpendicular at the intersection point.

**NOTE: Do not run signal or communications wiring and power wiring in 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 to all devices in the system when necessary.

## Grounding the TN-5305

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



**ATTENTION**

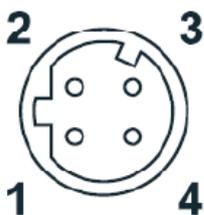
This product is intended to be mounted to a well-grounded mounting surface such as a metal panel.

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

All TN-5305 models have 5 10/100BaseT(X) Ethernet ports (4-pin shielded M12 socket with D coding). The 10/100TX ports located on the TN-5305's 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 sockets on TN-5305**

TP Port



- Pin 1: TD +
- Pin 2: RD +
- Pin 3: TD -
- Pin 4: RD -

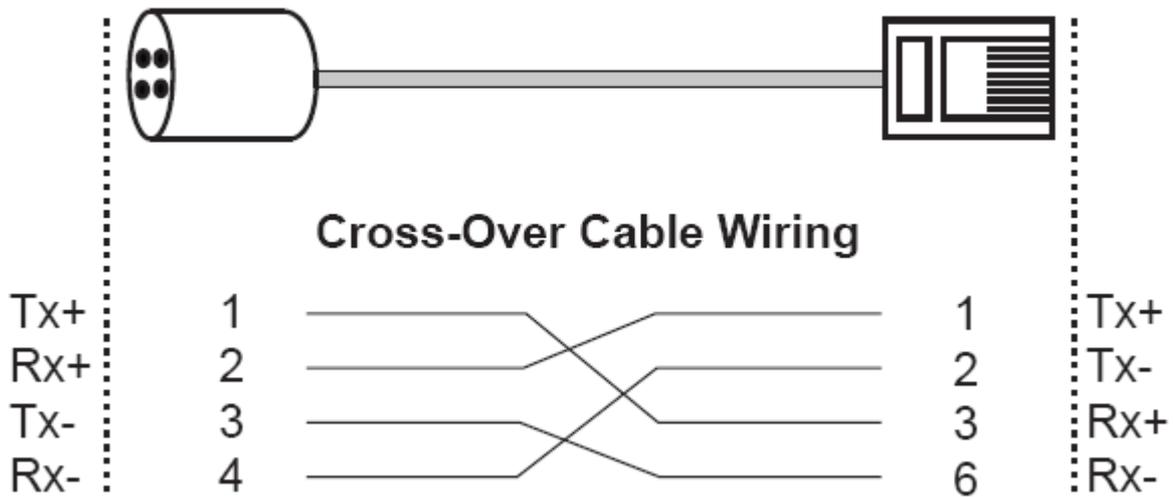
Power input



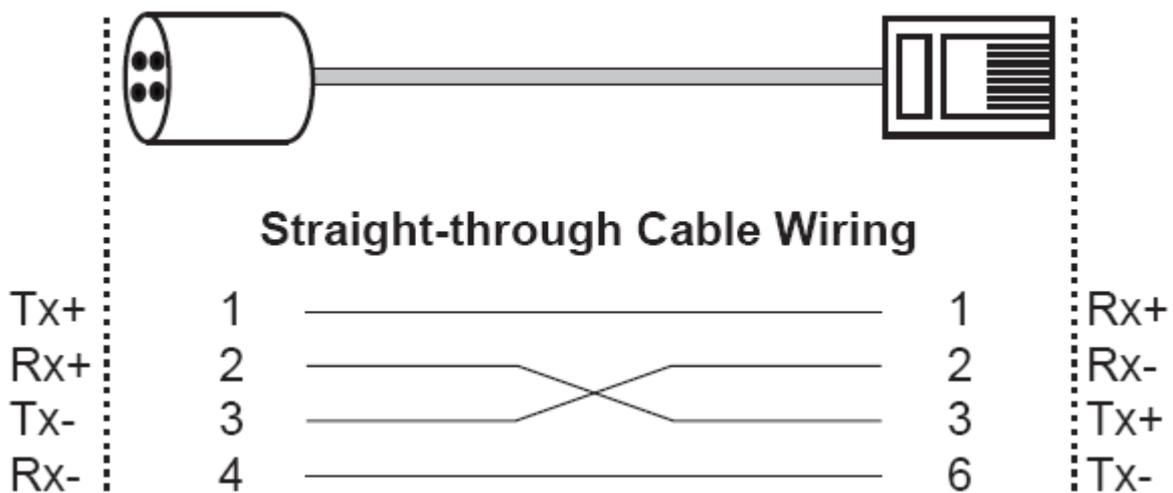
- Pin 1: Input V+
- Pin 2: Not assigned
- Pin 3: Input V-
- Pin 4: Not assigned
- Pin 5: Function ground



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



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



### Auto MDI/MDI-X Connection

The Auto MDI/MDI-X function allows users to connect TN-5305's 10/100BaseTX ports to any kind of Ethernet device, without needing to pay attention to the type of Ethernet cable being used for the connection. This means that you can use either a straight-through cable or cross-over cable to connect the TN-5305 to Ethernet devices.

### Dual Speed Functionality & Switching

The TN-5305's 10/100 Mbps switched M12 ports auto negotiate with the connected device to use the fastest data transmission rate supported by both devices. All of Moxa's ToughNet switches are plug-and-play devices, so that software configuration is not required. The half/full duplex mode for the switched M12 ports is user

dependent and changes (by auto-negotiation) to full or half duplex, depending on which transmission speed is supported by the attached device.

### Switching and Address Learning

The TN-5305 has an address table that can hold up to 1000 node addresses, which makes it suitable for use with large networks. The address tables are self-learning, so that as nodes are added or removed, or moved from one segment to another, the TN-5305 automatically keeps up with new node locations. An address-aging algorithm causes the least-used addresses to be deleted in favor of newer, more frequently used addresses. To reset the address buffer, power down the unit and then power it back up.

### Switching, Filtering, and Forwarding

Each time a packet arrives at one of the switched ports, a decision is made to filter or forward the packet.

Packets with source and destination addresses belonging to the same port segment will be filtered, constraining those packets to one port, and relieving the rest of the network from the need to process them.

A packet with destination address on another port segment will be forwarded to the appropriate port, and will not be sent to the other ports where it is not needed. Packets that are used in maintaining the operation of the network (such as the occasional multi-cast packet) are forwarded to all ports.

The TN-5305 operates in the store-and-forward switching mode, which eliminates bad packets and enables peak performance to be achieved when there is heavy traffic on the network.

### LED Indicators

Several LED indicators are located on the TN-5305's front panel. The function of each LED is described in the table below.

LED	Color	State	Description
PWR	AMBER	On	Power is being supplied to the power input.
		Off	Power is <b>not</b> being supplied to the power input.
LNK/ACT (10M)	AMBER	On	TP port's 10 Mbps link is active.
		Blinking	Data is being transmitted at 10 Mbps
		Off	TP port's 10 Mbps link is inactive.
LNK/ACT (100M)	GREEN	On	TP port's 100 Mbps link is active
		Blinking	Data is being transmitted at 100 Mbps.
		Off	TP port's 100 Mbps link is inactive.

## Auto-Negotiation and Speed Sensing

All of the TN-5305's Ethernet ports independently support auto-negotiation for speeds in the 10BaseT and 100BaseTX modes, with operation according to the IEEE 802.3u standard. This means that some nodes could be operating at 10 Mbps, while at the same time, other nodes are operating at 100 Mbps.

Auto-negotiation takes place when an M12 cable connection is made, and then each time a LINK is enabled.

The TN-5305 advertises its capability for using either 10 Mbps or 100 Mbps transmission speeds, with the device at the other end of the cable expected to advertise in the same way.

Depending on what type of device is connected, this will result in agreement to operate at a speed of either 10 Mbps or 100 Mbps. If an TN-5305's Ethernet port is connected to a non-negotiating device, it will default to 10 Mbps speed and half-duplex mode, as required by the IEEE 802.3u standard.

## Specifications

### Technology

Standards	IEEE 802.3, 802.3u, 802.3x
Processing	Type Store and Forward, with IEEE802.3x full duplex, back pressure flow control

### Interface

M12 Ports	10/100BaseTX auto negotiation speed, F/H duplex mode, and auto MDI/MDI-X connection
LED Indicators	Power, LNK/ACT
Power	
Input Voltage	12 to 45 VDC or 18 to 30 VAC (47 to 63 Hz)
Input Current	0.12A @ 24 VDC 0.28A @ 24 VAC
Connection M12	A-coding 5-pin male connector, single power input

### Protection

Overload current protection / Limited current	1.1A
Reverse polarity Protection	present

### Mechanical

Casing	IP67 protection, plastic case
Dimensions (W x H x D)	60 x 125 x 29.6 mm (2.4 x 4.9 x 1.2 in)
Weight	250g

Installation Panel mounting, DIN-Rail mounting (with optional kit)

**Environment**

Operating Temperature 0 to 60°C for standard model,  
-40 to 75°C for -T models

Storage Temperature -40 to 85°C

Operating relative

Humidity 5 to 95% (non-condensing)

**Regulatory Approvals**

Safety UL 508

Hazardous Location UL/cUL Class1, Div.2, ATEX Class1, Zone2 (pending)

Rail Traffic EN 50155, EN 50121-4 (pending)

Maritime DNV, GL, ABS, LR, NKK (pending)

EMI: FCC Part 15, CISPR (EN55022) class A

EMS: EN61000-4-2 (ESD), level 3  
EN61000-4-3 (RS), level 3  
EN61000-4-4 (EFT), level 3  
EN61000-4-5 (Surge), level 3  
EN61000-4-6 (CS), level 2

Shock: IEC60068-2-27

Free Fall: IEC60068-2-32

Vibration: IEC60068-2-6

**Note: Please check Moxa's website for the most up-to-date certification status.**

**MTBF** (meantime between failures)

Time 636,000 hrs

Database Telcordia (Bellcore), GB 25°C

**WARRANTY** 5 years