

# MobiRake PWSM-PWSA Wi10

## Portable & Vehicle Unit

### Quick Installation Guide

Version 1.0.1



*Hypercable*  
MobiRake

October. 2014

## 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.



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



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.



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



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



Follow the guidelines in this installation guide to ensure correct operation and safe use of the PWS-M-A Unit.

### There are four types PWS:

- A. PWSA041-1xx (400MHz TDMA radio with 2.4GHz 802.11b/g/n AP, without battery)
- B. PWSM041-1xx (400MHz MESH radio with 2.4GHz 802.11b/g/n AP, without battery)
- C. PWSA041-118 (400MHz TDMA radio with 2.4GHz 802.11b/g/n AP, with 12VDC 18AH battery)
- D. PWSM041-118 (400MHz MESH radio with 2.4GHz 802.11b/g/n AP, with 12VDC 18AH battery)

## PACKAGE CONTENTS

The package you have received should contain the following items:

- PWS-M-A unit .....x1
- 455 MHz ½ Lambda FME Flexible antenna .....x1
- 2.400 MHz ½ Lambda FME Flexible antenna .....x1
- FME/ N Male antenna adaptor .....x1
- RJ45 connector.....x1
- M12 VDC Power cable.....x1
- Waterproof IP cable gland.....x1

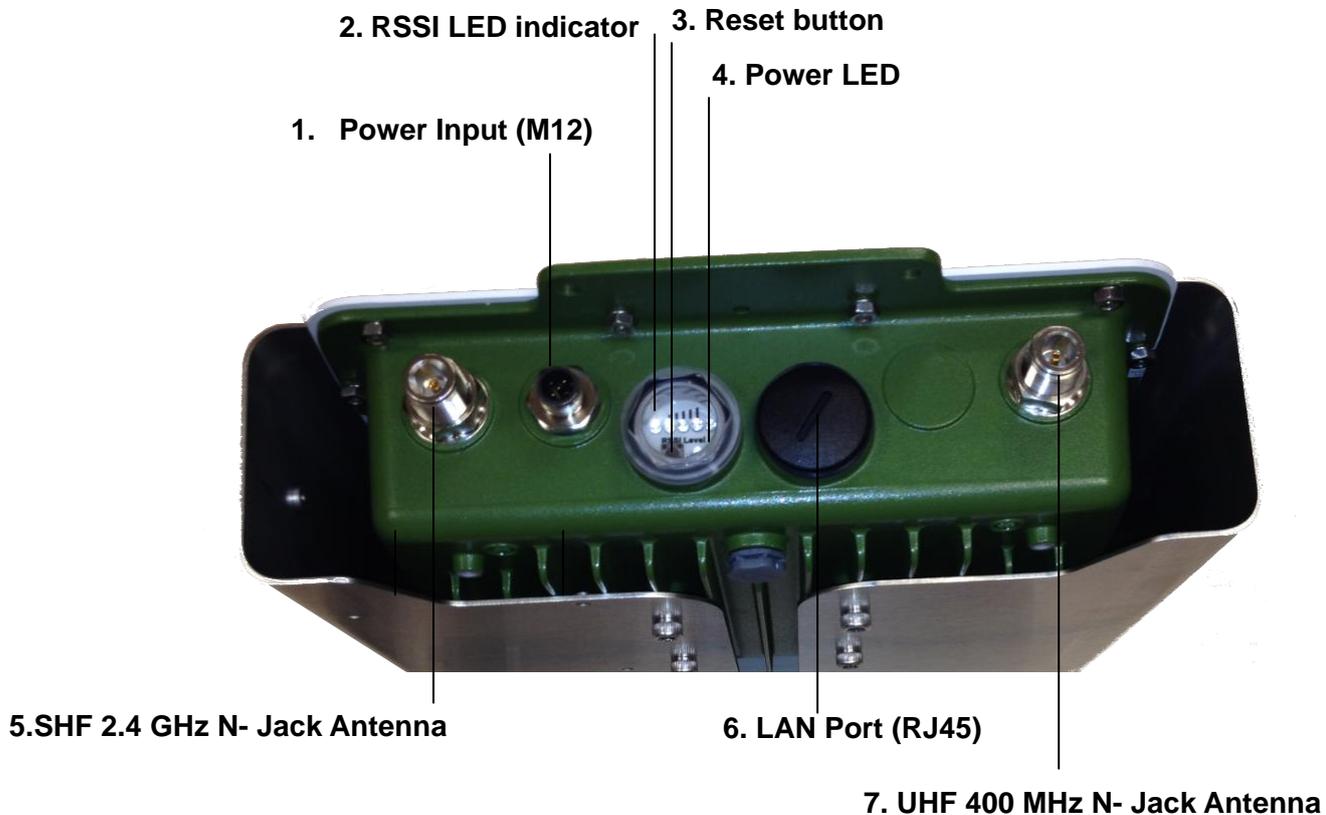


**If any item on the above list is not included or damaged, please contact your local vendor for support.**



## MECHANICAL DESCRIPTION

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

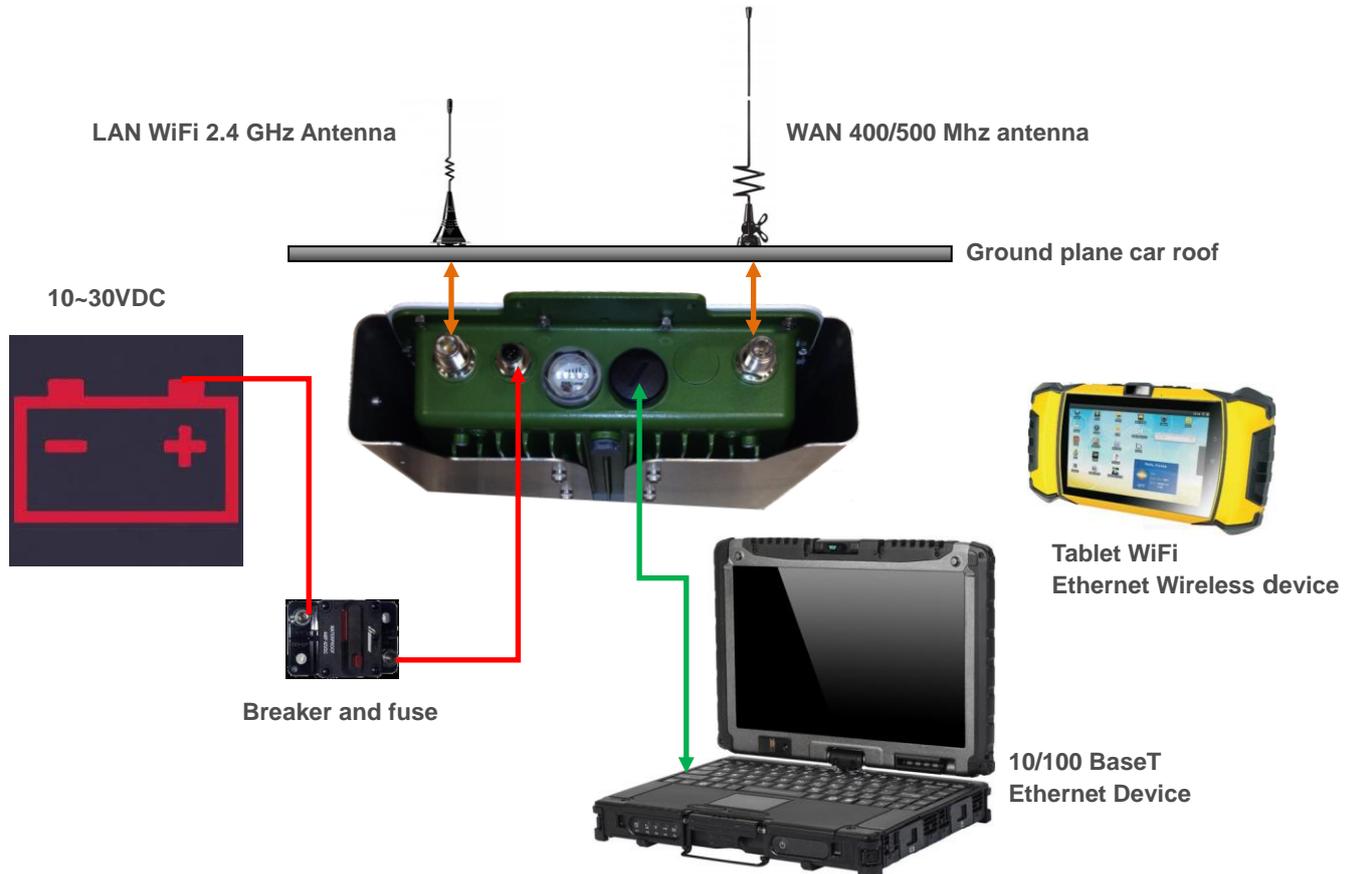


Portable/PWS-M-A Subscriber or Base Station Unit Figure

1	<b>Power Input (M12)</b>	Feed 10~30VDC power to the PWS-M-AUnit via this power Jack, please follow the pin assignment for correct + / - polarity, mix that might cause the damage of radio.
4	<b>Power LED</b>	Indicate status of power on or off.
2	<b>RSSI LED indicator</b>	This function only works at CPE mode to indicate the RSSI from Base Station, 5 LEDs (levels) totally, more LEDs means stronger signal level. ( For TDMA PMPT version only )
3	<b>Reset button</b>	press it and hold the reset button for 5~10 seconds, the PWS-M-AUnit will back to factory default settings.
5	<b>SHF 2.4 GHz N- Jack Antenna Connector</b>	Here you can attach the proper antenna with the PWS-M-Aunit 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)
6	<b>LAN Port (M12)</b>	Use the SFTP cat.5 cable with M12 connector to connect to the PWS-M-AUnit, and the other end to other Ethernet device such as PC or switch / router.
7	<b>UHF 400 MHz N- Jack Antenna Connector</b>	Here you can attach the proper antenna with the PWS-M-Aunit 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 PWS-M-A Subscriber Unit

This section show you how to mount the PWS-M-A 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 PWS-M-Aunit can be damaged by incorrect power application. Read and follow the installation instructions carefully before connecting the system to its power source. **Please do not forgett the Battery circuit Breaker and or fuse**

### 1. Mounting the PWS-M-Aunit 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 PWS-M-Aand antenna coaxial cable is grounded to the PWS-M

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

This PWS-M-AUnit support 10/100M Ethernet connection. Attach your SFTP cat.5 Ethernet cable with the M12 connector on the PWS-M-AUnit, 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

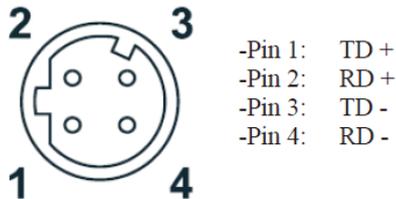
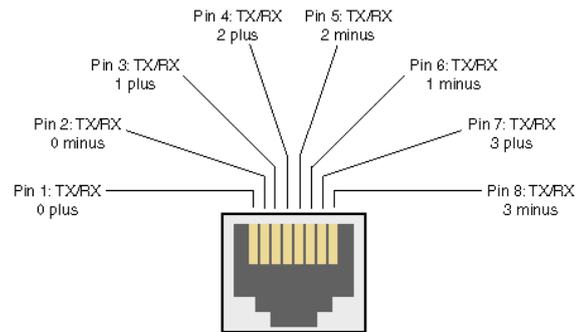


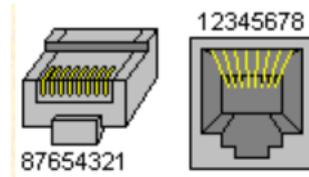
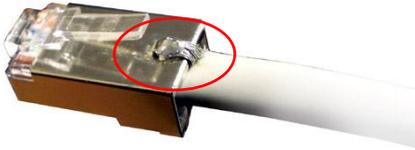
Figure 21. RJ-45 Connector Pin Assignments



## 3. Connect the LAN Port RJ45 version.



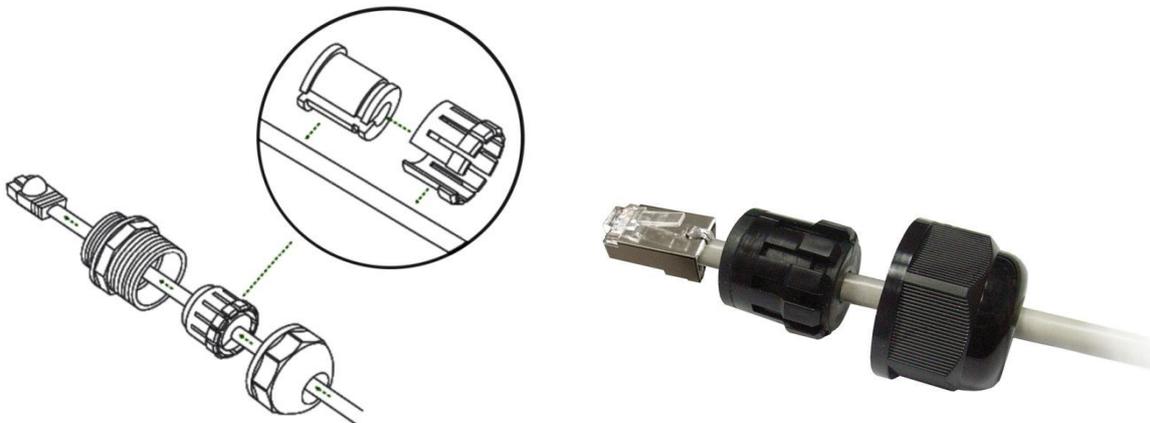
Welding the shielding parts of the SFTP cable and the RJ-45 connector well to ensure he performance of the system and avoid the moisture leak into the radio.



Weld the RJ-45 connector with the SFTP cable

## Appendix 1 – How to make the SFTP cable with waterproof connector between the radio and LAN network

The waterproof connector was formed by 3 pieces components as the following exploded view:



Blow is the complete figure for reference:

#### 4. Attached the antenna

Users can attach the proper antenna to the N-type connector on the PWS-M-AUnit.



**To meet regulatory restrictions, the PWS-M-AUnit and the external antenna must be professionally installed. ( Grounded and with VSWR less than 1.5)**

#### 5. Connect the Power Cable

Use the M12 connector to make a DC power cable to connect the PWS-M-AUnit and PWS-M-Apower supply.



#### ATTENTION

Feed in proper voltage range DC (10~30VDC) to the PWS-M-AUnit with correct polarity to make sure the PWS-M-AUnit works well. Please refer to below pinouts assignment for correct + / - polarity, mix that might cause damage to the PWS-M-AUnit.

Model (Indoor / PWS-M)	DC input range	Power consumption
400/500 MHz 5W	10~30V DC	Main board + RF module + 802.11abgn (Max. 25W)

MobiRake PWS-M-AUnit	12VDC	24VDC
Pure Tx mode	2 A.	1 A.
Pure Rx mode	1.5A	0.75A

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



**ATTENTION**



You should read and follow the installation instructions carefully before connecting the system to its power source. This wireless PWS-M-AUnit can be damaged by incorrect power supply.

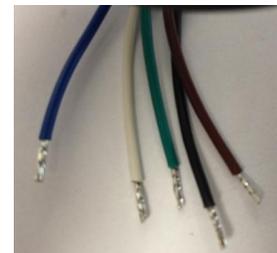
Power input



- Pin 1:
- Pin 2:
- Pin 3:
- Pin 4:
- Pin 5:

Color and pin assignment :

- Pin 1 – brown
- Pin 2 – white
- Pin 3 – blue
- Pin 4 – black
- Pin 5 – green



Pin 1, 2 & 3 are in common for Battery **V+**

Pin 4 & 5 are in common for Battery **V-** and Box **Ground**

**6. Align the antenna by the Bar Led**

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.

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

# 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.

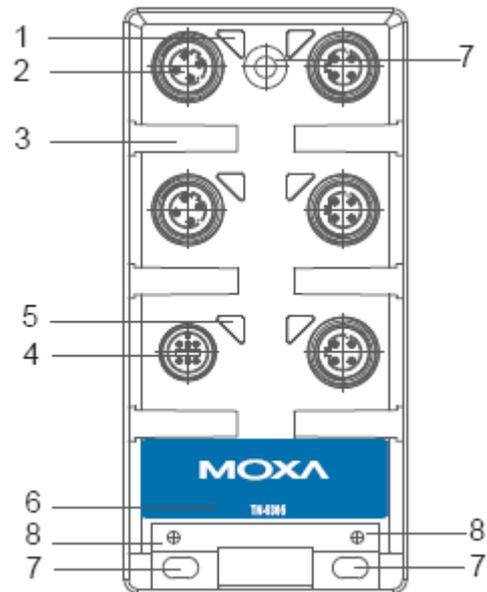
### *Rugged Design*

- 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.

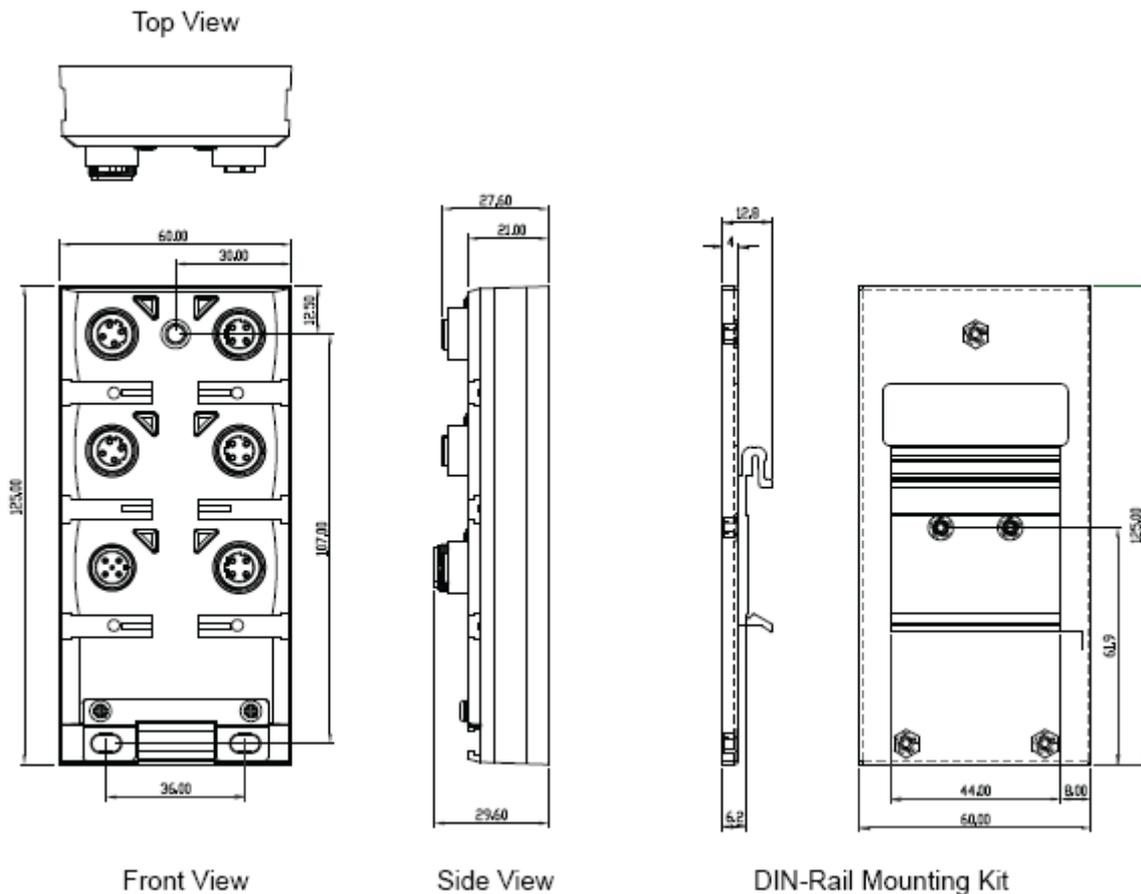
## TN-5305 Panel Layouts

### 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:**

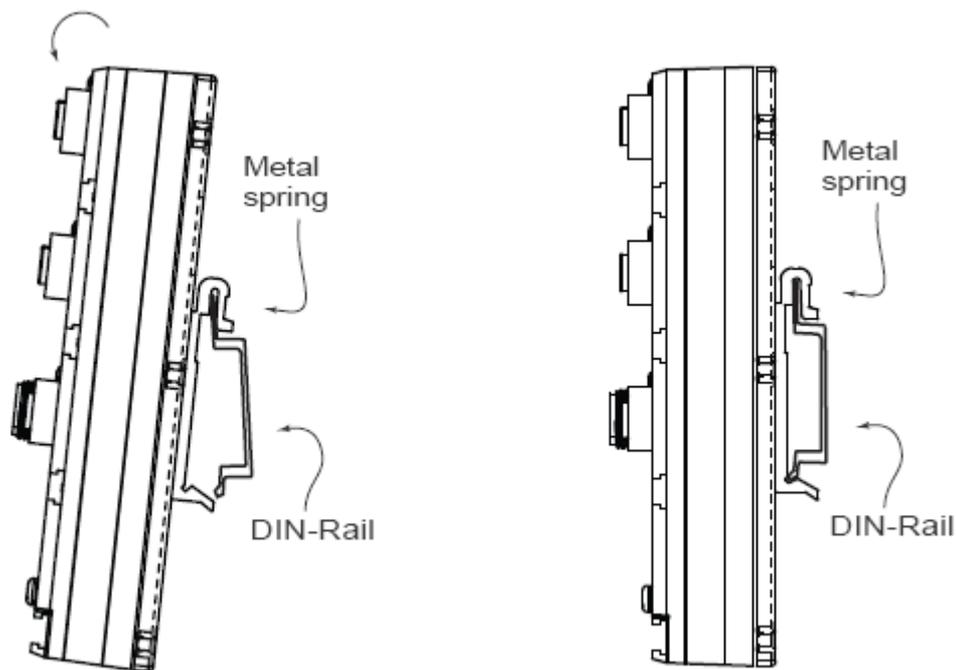
Fix the DIN-Rail attachment plate to the rear panel of the switch as shown in the above figure.

**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:

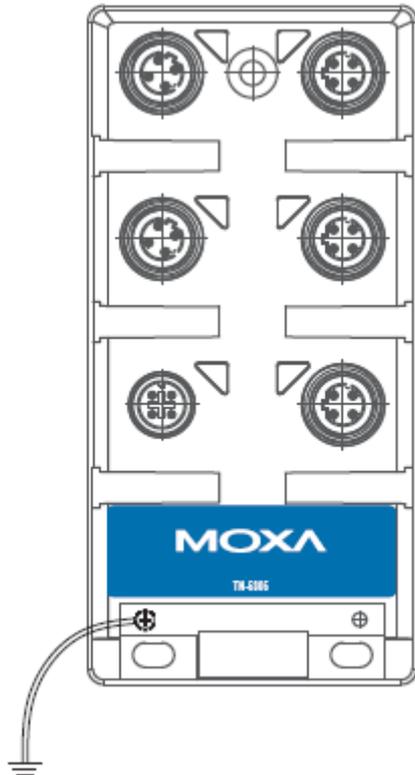
- Use separate paths to route wiring for power and devices. If power wiring and device wiring paths must cross, make sure the wires are perpendicular at the intersection point.

**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

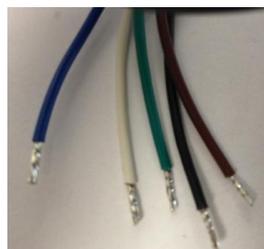


- Pin 1: TD +
- Pin 2: RD +
- Pin 3: TD -
- Pin 4: RD -

Power input



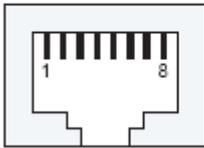
- Pin 1: Input V+
- Pin 2: Not assigned
- Pin 3: Input V-
- Pin 4: Not assigned
- Pin 5: Function ground



- Pin 1 – brown
- Pin 2 – white
- Pin 3 – blue
- Pin 4 – black
- Pin 5 – green

## Pinouts for RJ45 (8-pin)

### RJ45 (8-Pin)



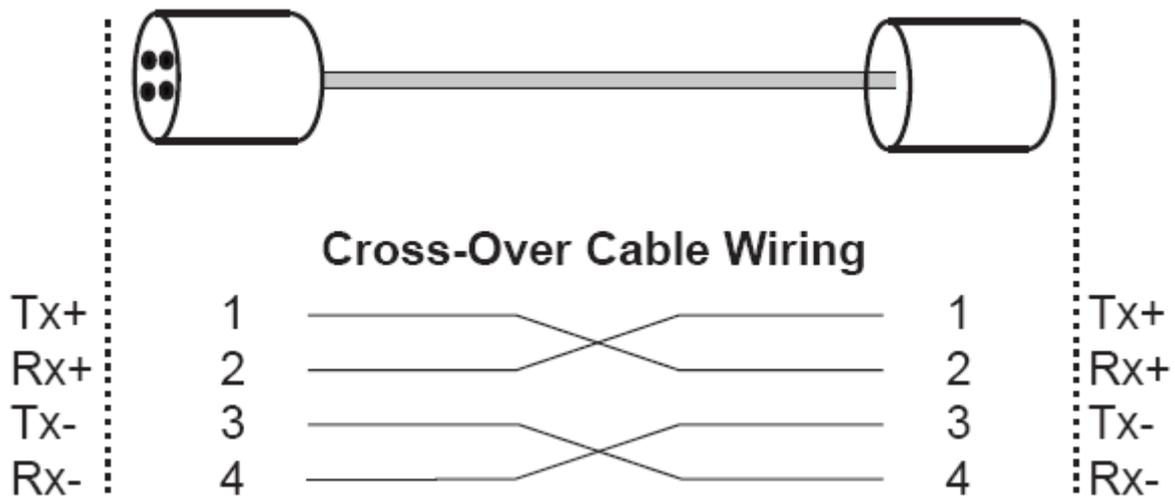
### MDI Port Pinouts

Pin	Signal
1	Tx +
2	Tx -
3	Rx +
6	Rx -

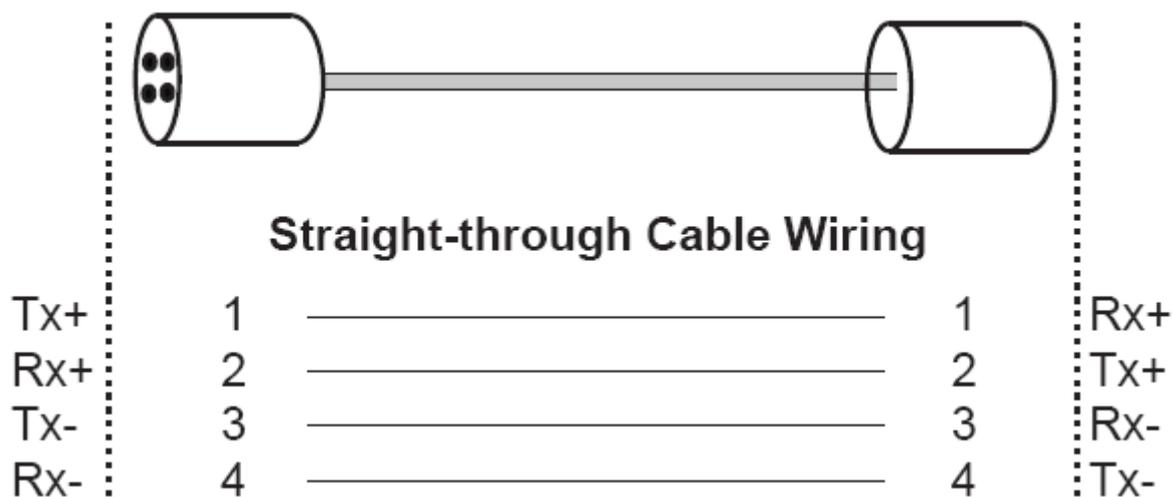
### MDI-X Port Pinouts

Pin	Signal
1	Rx +
2	Rx -
3	Tx +
6	Tx -

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



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





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)
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### 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