Moxa Industrial Media Converter

PTC-101
Hardware Installation Guide

Second Edition, February 2010

MOXA®

Overview

Moxa Industrial Media Converter, which is specially designed for reliable and stable operation in harsh industrial environments, provides industrial grade media conversion between 10/100BaseT(X) and 100BaseFX. PTC-101's reliable industrial design is excellent for keeping your industrial automation applications running continuously, and comes with a relay output warning alarm to help prevent damages and losses.

This product has a wide operating temperature range, from -40 to 85°C, and is designed to withstand a high degree of vibration and shock. The rugged hardware design makes PTC-101 perfect for ensuring that your Ethernet equipment can withstand critical industrial applications, such as in hazardous locations, and complies with FCC, UL, and CE standards.

Package Checklist

Moxa Industrial Media Converter is shipped with the following items. If any of these items is missing or damaged, please contact your customer service representative for assistance.
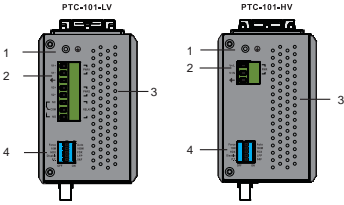
- Moxa Industrial Media Converter

- Hardware Installation Guide

- Moxa Product Warranty booklet

Features

- Supports 10/100Base-TX auto-negotiation and auto-MDI/MDI-X.

- Multi mode, single mode with SC or, ST, or LC fiber connector available.

- Supports Link Fault Pass-Through.

- Power failure by relay output (LV model only).

- Redundant dual VDC power inputs.

- -40 to 85°C operating temperature range.

- Integrated high-reliability power supply eliminates the need for external power transformer.
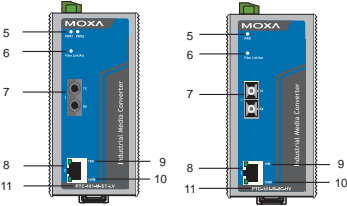
Panel Layout of PTC-101 Series

Top Panel View

PTC-101-LV

PTC-101-HV

Front Panel View
(PTC-101-M-ST-LV)

Front Panel View
(PTC-101-M-SC-HV)

Rear Panel View

Rear Panel View

1. Grounding screw
2. Terminal block for power input
3. Heat dissipation vents and relay output
4. DIP switch
5. Power input PWR LED
6. Fiber Link/Active LED
7. 100BaseFX Port (ST/SC/LC connector)
8. 10/100BaseT(X)
9. TP port 10 Mbps LED
10. TP port 100 Mbps LED
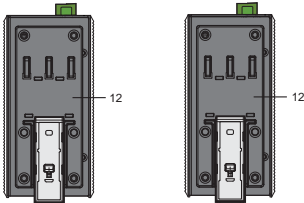11. Model Name
12. DIN-Rail mounting kit
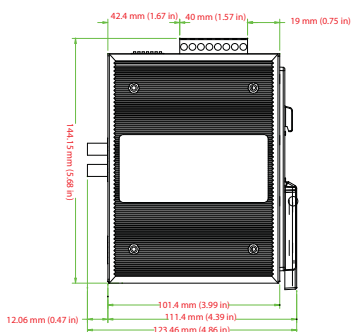
Dimensions (For PTC-101-M-SC-HV. Others are provided by requests.)
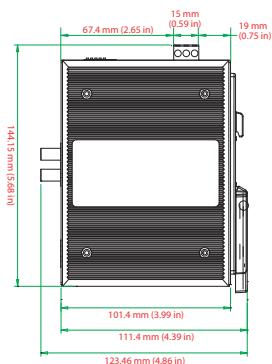
Side View (HV Models)

Side View (LV Models)
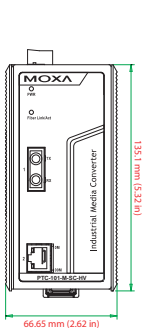
Front View
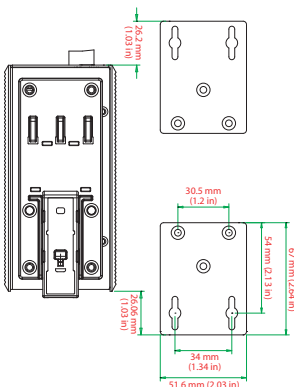
Rear View

Panel Mounting Kit (Optional)

Wiring Requirements

ATTENTION

Safety First!

Be sure to disconnect the power cord before installing and/or wiring your Moxa Industrial Media Converter.

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 pay attention to the following points:

- 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 Moxa Industrial Media Converter

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.

Wiring the Redundant Power Inputs for PTC-101-LV series

The top five contacts of the 8-contact terminal block connector on the PTC-101-LV's top panel are used for the PTC-101-LV's two DC inputs. Top and front views of one of the terminal block connectors are shown here.
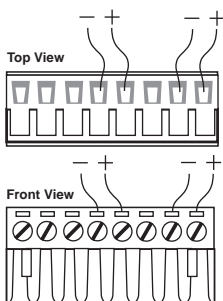
STEP 1: Insert the negative/positive DC wires into the V-/V+ terminals.

STEP 2: To keep the DC wires from pulling loose, use a small flat-blade screwdriver to tighten the wire-clamp screws on the front of the terminal block connector.

STEP 3: Insert the plastic terminal block connector prongs into the terminal block receptor, which is located on the PTC-101-LV's top panel.

ATTENTION

Before connecting PTC-101-LV to the DC power inputs, make sure the DC power source voltage is stable.

Communication Connections

PTC-101 models have one 10/100BaseT(X) Ethernet port, and one 100BaseFX (SC, ST, or LC type connector) fiber port.

10/100BaseT(X) Ethernet Port Connection

The 10/100BaseT(X) ports located on PTC-101's front panel are used to connect to Ethernet-enabled devices.

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

RJ45 (8-pin, MDI) Port Pinouts

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

RJ45 (8-pin, MDI-X) Port Pinouts

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

RJ45 (8-pin) to RJ45 (8-pin) Straight-Through Cable Wiring

Switch Port RJ45 Connector		Cable Wiring		NIC Port RJ45 Connector
Tx+	3	———	3	Rx+
Tx-	6	———	6	Rx-
Rx+	1	———	1	Tx+
Rx-	2	———	2	Tx-
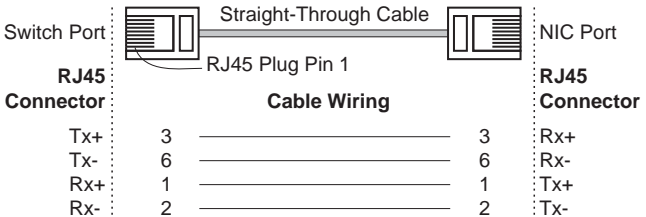
RJ45 (8-pin) to RJ45 (8-pin) Cross-Over Cable Wiring

Switch Port (NIC Port) RJ45 Connector		Cable Wiring		Switch Port (NIC Port) RJ45 Connector
(Rx+) Tx+	3	———	1	Rx+ (Tx+)
(Rx-) Tx-	6	———	2	Rx- (Tx-)
(Tx+) Rx+	1	———	3	Tx+ (Rx+)
(Tx-) Rx-	2	———	6	Tx- (Rx-)
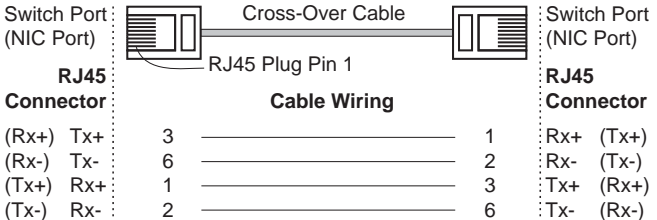
100BaseFX Ethernet Port Connection

The concept behind the SC port and cable is quite straightforward. Suppose you are connecting devices I and II. Contrary to electrical signals, optical signals do not require a circuit in order to transmit data. Consequently, one of the optical lines is used to transmit data from device I to device II, and the other optical line is used transmit data from device II to device I, for full-duplex transmission.
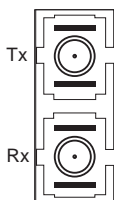
All you need to remember is to connect the Tx (transmit) port of device I to the Rx (receive) port of device II, and the Rx (receive) port of device I to the Tx (transmit) port of device II. If you are making your own cable, we suggest labeling the two sides of the same line with the same letter (A-to-A and B-to-B, as shown below, or A1-to-A2 and B1-to-B2).

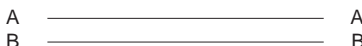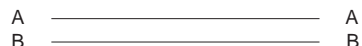**SC-Port Pinouts**   **SC-Port to SC-Port Cable Wiring**
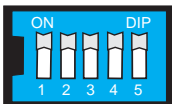
ST-Port Pinouts   **ST-Port to ST-Port Cable Wiring**

Redundant Power Inputs

For PTC-101-LV series, both power inputs can be connected simultaneously to live DC power sources. If one power source fails, the other live source acts as a backup, and automatically supplies all of Moxa Industrial Media Converter's power needs.

DIP Switch Setting

DIP No.	Function	ON	OFF
1	Auto Negotiation	Enable	Disable
"ON": Enables "Auto Negotiation" function, the speed and duplex states for each port link segment are automatically configured using the highest performance interoperation mode.			
"OFF": Disables "Auto Negotiation" function, the speed and duplex states depend on the manual setting configuration.			
2	Force TP Speed	100Mbps	10Mbps
(Only when Auto Negotiation is disabled)			
"ON": Forces 100Mbps on Ethernet port.			
"OFF": Forces 10Mbps on Ethernet port.			
3	Force TP Duplex	Full Duplex	Half Duplex
(Only when Auto Negotiation is disabled)			
"ON": Forces Full Duplex on Ethernet port.			
"OFF": Forces Half Duplex on Ethernet port.			
4	Link Fault Pass Through	Enable	Disable
"ON": Enables "Link Fault Pass Through", the link status on the TX port will inform the FX port of the same device and vice versa.			
"OFF": Disables "Link Fault Pass Through", the link status on the TX port will not inform the FX port.			
5	Operating Mode	Store-and-Forward	Pass Through
"ON": Selects "Store-and-Forward" mode, begins to forward a packet to a destination port after an entire packet is received. The latency depends on the packet length.			
"OFF": Selects "Pass Through" mode, operates with the minimum latency. Both transceivers are interconnected via internal MIIs and the internal switch engine and data buffer are not used.			
Note: With "Pass Through" mode enabled, the Ethernet port and fiber port should transmit at 100 Mbps, which is equivalent to full duplex mode.			

Default DIP settings are all at ON position.

ATTENTION

After changing the DIP switch setting, you will need to power off and then power on the PTC-101 to activate the new setting.

LED Indicators

The front panel of Moxa Industrial Media Converter contains several LED indicators. The function of each LED is described in the table below.

LED	Color	State	Description
PWR1	Green	On	Power is being supplied to power input PWR1
		Off	Power is **not** being supplied to power input PWR1
PWR2	Green	On	Power is being supplied to power input PWR2
		Off	Power is **not** being supplied to power input PWR2
Fiber/Link /Act	Green	On	Fiber port is active
		Blinking	Data is being transmitted or received.
		Off	Fiber is inactive
10M	Yellow	On	Ethernet port 100 Mbps link is active
		Blinking	Data is being transmitted at 10 Mbps
		Off	Ethernet port 10 Mbps link is inactive
100M	Green	On	Ethernet port 100 Mbps is active
		Blinking	Data is being transmitted at 100 Mbps
		Off	Ethernet port 100 Mbps link is inactive

Specifications

Technology

Standards	IEEE 802.3 for 10BaseT
	IEEE 802.3u for 100BaseT(X), 100BaseFX

Interface

RJ45 ports	10/100BaseT(X)
Fiber ports	100BaseFX (SC/ST/LC connectors)
LED Indicators	PTC-101-HV series: PWR1, Fiber Link, 10/100M (TP port)
	PTC-101-LV series: PWR1, PWR2, Fiber Link, 10/100M (TP port)

Dip Switches:

Dip No.	Function	ON	OFF
1	Auto Negotiation	Enable	Disable
2	Force TP Speed	100 Mbps	10 Mbps
3	Force TP Duplex	Full Duplex	Half Duplex
4	Link Fault Pass Throuth	Enable	Disable
5	Operating Mode	Store-and-Forward	Pass Through

Default DIP settings are all at ON position.

Alarm Contact   One relay output with current carrying capacity of 1 A @ 24 VDC

Optical Fiber:

	100BaseFX	
	Multi-mode	**Single-mode**
Wavelength	1300 nm	1310 nm
Max. TX	-10 dBm	0 dBm
Min. TX	-20 dBm	-5 dBm
RX Sensitivity	-32 dBm	-34 dBm
Link Budget	12 dB	29 dB
Typical Distance	5 km[a] 4 km[b]	40 km[c]
Saturation	-6 dBm	-3 dBm

a. 50/125 μm, 800 MHz*km fiber optic cable
b. 62.5/125 μm, 500 MHz*km fiber optic cable
c. 9/125 μm, 3.5 PS/(nm*km) fiber optic cable

Power Requirements

Input Voltage:

Power Supply Type		Power Consumption	Fuse Rating
LV-DC	20 VDC ~ 72 VDC	170mA@20VDC	3.15A(T) 2
HV-AC	85 VAC ~ 264 VAC	73mA@85VAC	3.15A(T) 2
HV-DC	88 VDC ~ 300 VDC	47mA@88VDC	3.15A(T) 2

Connection   Removable Terminal Block

Overload Current Protection   1.6 A (protects against two signals shorted together)

Reverse Polarity Protection   Present

Physical Characteristics

Housing   Aluminum, IP30 protection

Dimensions (W x H x D)   122.5 x 90 x 20 mm (4.82 x 3.54 x 0.79 in)

Weight   Product only: 690 g

     Packaged: 875 g

Environmental Limits

Operating Temperature   -40 to 85°C (-40 to 185°F)

Storage Temperature   -40 to 85 °C (-40 to 185 °F)

Operating Humidity   5 to 90%

Regulatory Approvals

Safety	UL 60950-1
EMI	FCC Part 15, CISPR (EN55022) class A
EMS	EN61000-4-2 Edition 1.2: 2001-04 (Level 4) EN61000-4-3: 1995+A1: 2001 IEC 61000-4-3: 2002+A1: 2002 (Level 3) EN61000-4-4: 2004 (Level 4) EN61000-4-5: 2001-04 (Level 4) EN61000-4-6: 2004-11 (Level 3) EN61000-4-8: 2001-03 (Level 5) EN61000-4-11: 2004-03 (Criteria B)
Power Automation	IEC 61850-3, IEEE 1613
Rail Traffic	EN50155/EN50121-4
Warranty	5 years
	Details: See www.moxa.com/warranty

Technical Support Contact Information

www.moxa.com/support

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