IMC-21GA
Hardware Installation Guide

Moxa Industrial Media Converter

Second Edition, October 2014

Overview

The IMC-21GA series includes industrial 10/100/1000BaseT(X) to 100/1000BaseFX media converters that provide a cost-effective solution, and are specially designed for reliable and stable operation in industrial environments.

Package Checklist

Moxa's IMC-21GA is shipped with the following items. If any of these items are missing or damaged, please contact your customer service representative for assistance.
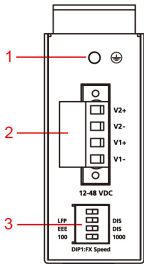
- IMC-21GA media converter
- Hardware installation guide (this guide)
- Warranty card

Features

- The fiber port's connection speed is DIP switch selectable
- Supports Link Fault Pass-Through (LFP)
- DIN rail mountable
- Multi mode (0.5 km) and single mode (10 km) models with SC fiber connectors are available
- Operating temperature range from -40 to 75°C (T models)
- 10K Jumbo Frame
- Redundant power inputs
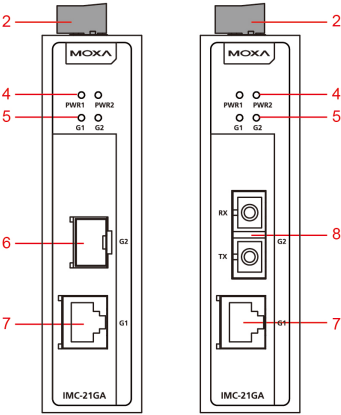- Supports Energy Efficient Ethernet (IEEE 802.3 az)

Panel Layout

Top View

Front View

IMC-21GA

IMC-21GA-SX-SC
IMC-21GA-LX-SC

1. Shielding Ground
2. Terminal block for power input
3. Dip switch
4. Power LED
5. Gigabit Copper (G1) / Fiber (G2) Port LED
6. SFP module slot
7. 10/100/1000BaseT(X) Port
8. SX/LX Fiber Port, SC connector
9. DIN rail kit

Rear View
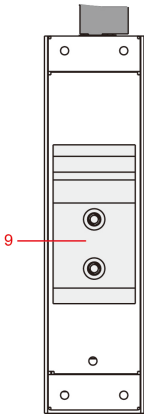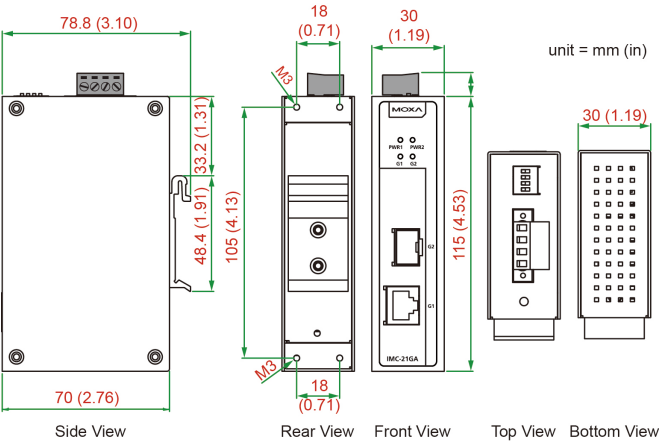
Mounting Dimensions

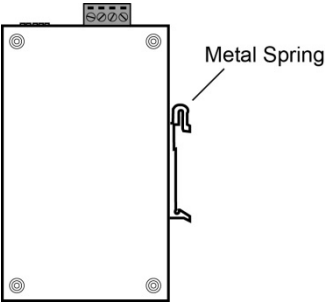
Side View   Rear View Front View   Top View Bottom View

unit = mm (in)

DIN Rail Mounting

The aluminum DIN rail attachment plate should be fixed to the back panel of the IMC-21GA when you take it out of the box. If you need to reattach the DIN rail attachment plate to the IMC-21GA, make sure the stiff metal spring is situated towards the top.

Metal Spring

Wiring Requirements

⚠️ **ATTENTION**

Safety First!

Be sure to disconnect the power cord before installing and/or wiring your IMC-21GA.

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 rating, the wiring could overheat, causing serious damage to your equipment.

- 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.

- 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.
- We strongly advise that you label wiring to all devices in the system.

Grounding the IMC-21GA
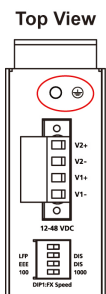
Grounding and wire routing help limit the effects of noise due to electromagnetic interference (EMI). Run the ground connection from the ground screw to the grounding surface prior to connecting devices.
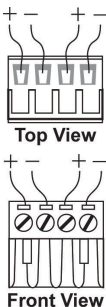
⚠️ **ATTENTION**

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

Wiring the Power Inputs

The 4-contact terminal block connector on the IMC-21GA's top panel is used for the IMC-21GA'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 located on IMC-21GA's top panel.

Redundant Power Inputs

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 the IMC-21GA's power needs.

Communication Connections

RJ45 Ethernet Port Connection

The IMC-21GA has one 10/100/1000BaseT(X) Ethernet port located on the front panel for connecting to Ethernet-enabled devices.

When connected to a 10/100 Mbps Ethernet port, the pinouts and cable wiring diagrams for both MDI (NIC-type) and MDI-X (HUB/switch-type) ports for both straight-through and cross-over Ethernet cables are:

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-

8-pin RJ45

Straight-Through Cable Wiring

Cross-Over Cable Wiring
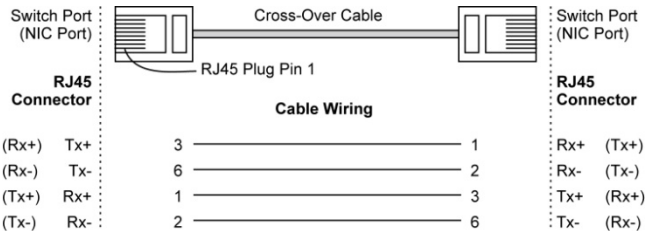
1000BaseT(X) Ethernet Port Connection

1000BaseT(X) data is transmitted on differential TRD+/- signal pairs over copper wires. When connected to a 1000 Mbps Ethernet port, the pinouts and cable wiring diagrams for both MDI (NIC-type) and MDI-X (HUB/switch-type) ports for both straight-through and cross-over Ethernet cables are:
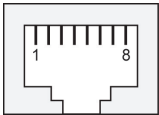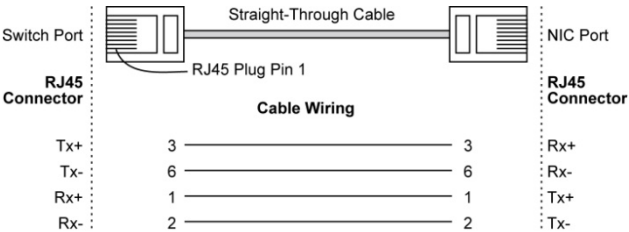
MDI/MDI-X Port Pinouts

Pin	Signal
1	TRD (0) +
2	TRD (0) -
3	TRD (1) +
4	TRD (2) +
5	TRD (2) -
6	TRD (1) -
7	TRD (3) +
8	TRD (3) -
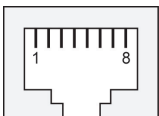
1000BaseSFP Fiber Port Connection

The Gigabit Ethernet ports on the IMC-21GA are 1000BaseSFP Fiber ports, which require using Gigabit mini-GBIC fiber transceivers to work properly.

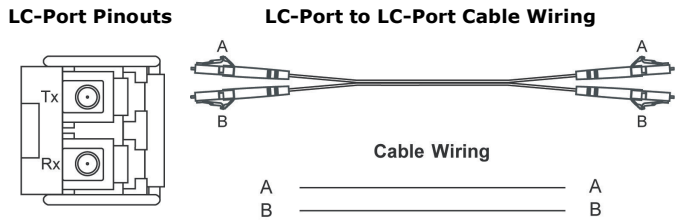The concept behind the LC port and cable is straightforward. Suppose you are connecting devices I and II; contrary to electrical signals, optical signals do not require a circuit in order to transmit data. Consequently, one of the optical lines is used to transmit data from device I to device II, and the other optical line is used transmit data from device II to device I, for full-duplex transmission.

Remember 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 make 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).

LC-Port Pinouts   **LC-Port to LC-Port Cable Wiring**

1000BaseSX/LX Fiber Port (IMC-21GA-SX-SC, IMC-21GA-LX-SC)

The concept behind the SC port and cable is 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.
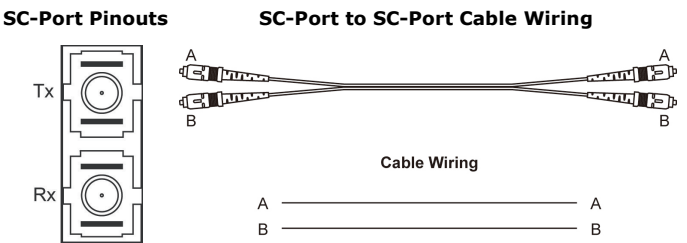
All you need to remember is to connect the Tx (transmit) port of device I to the Rx (receive) port of device II, and the Rx (receive) port of device I to the Tx (transmit) port of device II. If you make your own cables, we suggest labeling the two sides of the same line with the same letter (A-to-A and B-to-B, as shown below, or A1-to-A2 and B1-to-B2).

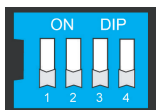**SC-Port Pinouts**   **SC-Port to SC-Port Cable Wiring**

ATTENTION

The IMC-21GA is only compatible with transceiver modules from Moxa's SFP-1G series and SFP-1FE series. If you are using the SFP-1FESLC-T, SFP-1FELLC-T, or SFP-1FEMLC-T, use version V1.3 or above to ensure that the IMC-21GA's media converter functionality works properly.

ATTENTION

This is a Class 1 Laser/LED product. To avoid causing serious damage to your eyes, do not stare directly into the laser beam.

DIP Switch Settings

| Dip No.	Function	ON	OFF
1	Fiber Speed	100M	1000M*
	"ON": Forces 100 Mbps on fiber port *Note: When setting the mode for the IMC-21GA, use Moxa SFP-1FE Series SFP modules* "OFF": Forces 1000 Mbps on fiber port *Note: When setting the mode for the IMC-21GA, use Moxa SFP-1G Series SFP modules*		
2	Energy Efficient Ethernet	Enable	Disable*
	"ON": Enable "Energy Efficient Ethernet" to allow for less power consumption during periods of low data activity "OFF": Disable "Energy Efficient Ethernet"		
3	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.		
4	Reserved		

*Default setting

After changing the DIP switch setting, you will need to power off and then power on the IMC-21GA.

LED Indicators

The front panel of the Moxa IMC-21GA contains several LED indicators. The function of each LED is described in the table below.

LED	Color	State	Description
PWR1	Amber	On	Power is being supplied to power input (V1+, V1-)
		Off	Power is not being supplied to power input (V1+, V1-)
PWR2	Amber	On	Power is being supplied to power input (V2+, V2-)
		Off	Power is not being supplied to power input (V2+, V2-)
G1	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
	Amber	On	TP port's 10/100 Mbps link is active
		Blinking	Data is being transmitted at 10/100 Mbps
		Off	TP port's 10/100 Mbps link is inactive
G2	GREEN	On	Fiber port's 1000 Mbps link is active
		Blinking	Data is being transmitted at 1000 Mbps
		Off	Fiber port's 1000 Mbps link is inactive
	Amber	On	Fiber port's 100 Mbps link is active
		Blinking	Data is being transmitted at 100 Mbps
		Off	Fiber port's 100 Mbps link is inactive

LFP: DIP switch is set to "LFP" mode
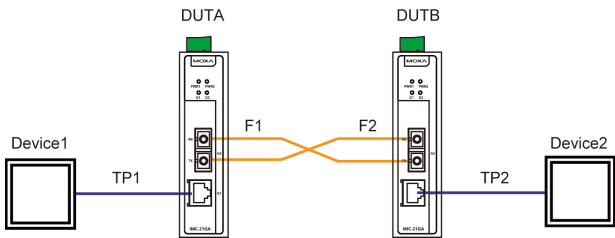
	Device1 TP LED	DUTA TP LNK (G1) LED	DUTA FO (G2) LED	DUTB FO (G2) LED	DUTB TP LNK (G1) LED	Device 2 TP LED
TP1 Faulted	OFF	OFF	OFF	OFF	OFF	OFF
F1 Faulted	OFF	OFF	OFF	OFF	OFF	OFF
F2 Faulted	OFF	OFF	OFF	OFF	OFF	OFF
TP2 Faulted	OFF	OFF	OFF	OFF	OFF	OFF

LFP: DIP switch is set to "DIS" mode
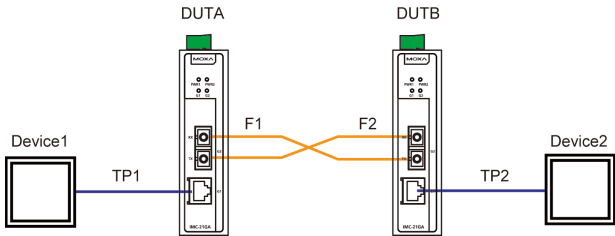
	Device1 TP LED	DUTA TP LNK (G1) LED	DUTA FO (G2) LED	DUTB FO (G2) LED	DUTB TP LNK (G1) LED	Device 2 TP LED
TP1 Faulted	OFF	OFF	ON	ON	ON	ON
F1 Faulted	ON	ON	OFF	OFF	ON	ON
F2 Faulted	ON	ON	OFF	OFF	ON	ON
TP2 Faulted	ON	ON	ON	ON	OFF	OFF

Auto MDI/MDI-X Connection

The Auto MDI/MDI-X function allows users to connect the Moxa IMC-21GA's 10/100/1000BaseT(X) ports to any kind of Ethernet device, regardless of the type of Ethernet cable used for the connection. This means that you can use either a *straight-through* cable or *cross-over* cable to connect the IMC to Ethernet devices.

Auto-Negotiation and Speed Sensing

All of the IMC-21GA's RJ45 Ethernet ports independently support auto-negotiation for transmission speeds of 10 Mbps, 100 Mbps , and 1000 Mbps, 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 or 1000 Mbps. Auto-negotiation takes place when an RJ45 cable connection is made, and then each time a LINK is enabled. The IMC-21GA advertises its capability for using 10 Mbps, 100 Mbps, or 1000 Mbps transmission speeds, with the device at the other end of the cable expected to advertise similarly.

Depending on what type of device is connected, this will result in agreement to operate at a speed of 10 Mbps, 100 Mbps, or 1000 Mbps.

If the IMC-21GA's RJ45 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, 802.3ab, 802.3z, 802.3az
Interface	
RJ45 Port	10/100/1000BaseT(X), RJ45 connector
Fiber Port	IMC-21GA-SX/LX-SC: 100/1000Base-SX/LX, SC connector
	IMC-21GA: 100/1000BaseSFP slot
LED Indicators	Power (PWR1, PWR2), G1 (TP Port), G2 (Fiber Port)

DIP Switch	The following are DIP switch selectable: Fiber port's connection speed (FX Speed), Energy Efficient Ethernet (EEE), Link Fault Pass Through (LFP)

Fiber Optics		
	Multi mode (IMC-21GA-SX-SC)	Single mode (IMC-21GA-LX-SC)
Distance, km	0.5	10
Wavelength, nm	850	1310
Min. Tx Output, dBm	-10	-9
Max. Tx Output, dBm	-3	-3
Sensitivity, dBm	-20	-21

Power Requirements	
Input Voltage	12 to 48 VDC (10 to 60 VDC)
Input Current	284.7 mA @ 12 VDC; 156.0 mA @ 24 VDC
Connection	Removable 4-contact screw-on terminal block
Overload Current Protection	1.5 A
Reverse Polarity Protection	Present

Physical Characteristics	
Housing	IP30 protect, metal case
Dimensions	30 × 115 × 70 mm (1.19 x 4.53 x 2.76 in)
Weight	170 g
Installation	DIN rail mounting

Environmental Limits	
Operating Temperature	Standard models: -10 to 60°C (14 to 140°F) Wide temp. models: -40 to 75°C (-40 to 167°F)
Storage Temperature	-40 to 75°C (-40 to 167°F)
Ambient Relative Humidity	5 to 95% (non-condensing)

Regulatory Approvals	
Safety	UL 60950-1
EMI	FCC Part 15, CISPR (EN 55022) class A
EMS	EN 61000-4-2 (ESD) Level 3 EN 61000-4-3 (RS) Level 3 EN 61000-4-4 (EFT) Level 3 EN 61000-4-5 (Surge) Level 3 EN 61000-4-6 (CS) Level 3
Shock	IEC 60068-2-27
Free Fall	IEC 60068-2-32
Vibration	IEC 60068-2-6
Warranty	5 years

Federal Communications Commission Statement

FCC—This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

⚠ FCC WARNING

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his or her own expense.