ICF-1150 Series
Quick Installation Guide

Version 8.1, January 2021

MOXA®

Overview

Introduction

ICF-1150 series fiber converters have a multi-interface circuit that can handle RS-232 and RS-422/485 serial interfaces, as well as multi-mode or single-mode fiber. ICF-1150 series converters extend serial transmission distance up to 5 km (ICF-1150-M, with multi-mode fiber) or up to 40 km (ICF-1150-S, with single-mode fiber).

Why Convert Serial to Fiber?

Fiber communication not only extends the communication distance, but also provides many advantageous features.

IMMUNITY FROM ELECTRICAL INTERFERENCE: Fiber is not affected by electromagnetic interference and radio frequency interference. It provides a clean communication path and is immune to cross-talk.

INSULATION: Optical fiber is an insulator; the glass fiber eliminates the need for using electric currents as the communications medium.

SECURITY: Fiber cannot be tapped by conventional electronic means and is very difficult to tap into optically. Furthermore, radio and satellite communication signals can be captured easily for decoding.

RELIABILITY & MAINTENANCE: Fiber is immune to adverse temperature and moisture conditions, does not corrode or lose its signal, and is not affected by short circuits, power surges, or static electricity.

Reverse Power Protection

The Reverse Power Protection feature provides extra protection against accidentally connecting the power cables to the wrong terminal. The converter is designed to detect automatically which power wire is positive and which is negative, and then adjust the power supply accordingly.

3-Way Communication

The ICF-1150 series supports 2 serial ports. The D-sub connector is for RS-232 communication and the removable terminal block is for RS-422 or RS-485 communication. The 3 ports (2 serial ports and one fiber port) are completely independent. When the ICF-1150 series converters receive data from any port, it will send data out through the other 2 ports. For example, when the ICF-1150 series converters receive a command from the remote Master via the fiber port, it will convert the command and transmit it via the RS-232 port and RS-422/485 port at the same time. So if the user is trying to monitor a system running on the RS-485 network, there is no need to use an additional RS-232 to RS-485 converter to connect the laptop computer's serial port to the RS-485 bus.

> ⚠️ **ATTENTION**
>
> The ICF-1150 is designed to receive data from one port and send data to the other ports. If the ICF-1150 receives data from 2 ports at the same time, a data error may occur on all of the RX ports.

Rotary Switch for Setting the Pull Up/Down Resistor

Since the RS-485 port can support multi-drop connections or daisy-chain connections, system engineers can connect meters, RTUs, readers, and many other devices together on the same bus. The impedance of the data line will rise according to the number of serial devices on the same bus. To get the system working, the ICF-1150 has a setting for tuning the pull up/down resistor. Just turn the dial to find the best resistor value for the system without removing the ICF-1150 from the DIN rail. (The default settings are 1k for both switches.)

Pull Up/Down Resistor

Position	0	1	2	3	4	5	6	7	8	9
Ohms	150k	10k	4.7k	3.3k	1k	909	822	770	500	485

DIP Switch for Selectable Terminator

The termination resistor for many products of this type is set by a jumper located inside the product's casing. To disable or change the resistor's strength, the user must open the casing to reset the jumper. Moxa offers a more user-friendly solution that allows users to set the termination resistor with a DIP switch located outside the ICF-1150 converter's casing.

No Configuration Required for Baudrate Settings

The ICF-1150 works under any baudrate from 50 bps to 921.6 kbps. The ICF-1150 simply converts the signal back and forth between serial (RS-232, RS-422, or RS-485) and fiber. Since the ICF-1150 does not need to interpret the signal, it does not need to know the baudrate of the transmitting device. For this reason, the ICF-1150 does not have any DIP switches or jumpers for setting the baudrate.

Ring Mode

To allow one half-duplex serial device to communicate with multiple half-duplex devices connected to a fiber ring, you should configure the ICF-1150 for "ring mode" by setting DIP switch "SW3" to the "On" position. The Tx port of a particular ICF-1150 unit connects to the neighboring converter's Rx port to form the ring. Note that when one node transmits a signal, the signal travels around the ring until it returns back to the transmitting unit, which then blocks the signal. Users should ensure that the total fiber ring length is less than 100 km when using either single-mode models or multi-mode models.

Features

- "Ring" or "Point to Point" transmission
- Extend RS-232/422/485 transmission distance:
  - ➢ up to 40 km with single-mode—ICF-1150-S series
  - ➢ up to 5 km with multi-mode—ICF-1150-M series
- Supports baudrates up to 921.6 kbps
- 3-way galvanic isolation (for –I models)
- Wide operating temperature from -40 to 85°C (for "T" models)
- C1D2, ATEX, and IECEx certified for harsh industrial environments
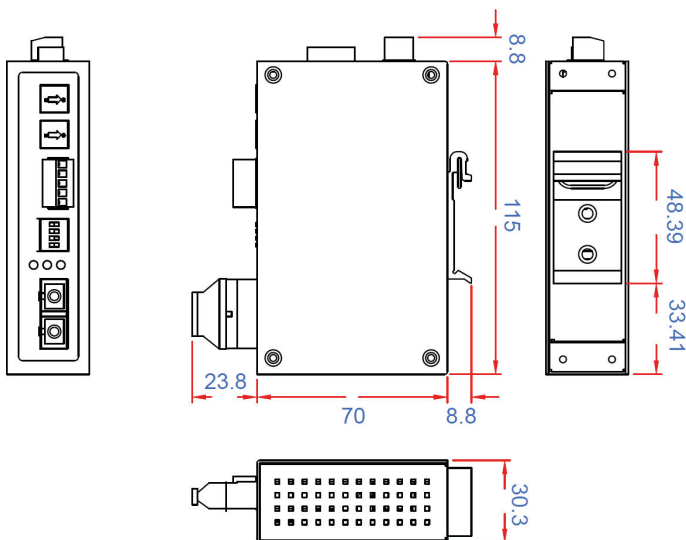
Package Checklist

Before installing the ICF-1150, verify that the package contains the following items:

- ICF-1150 fiber converter
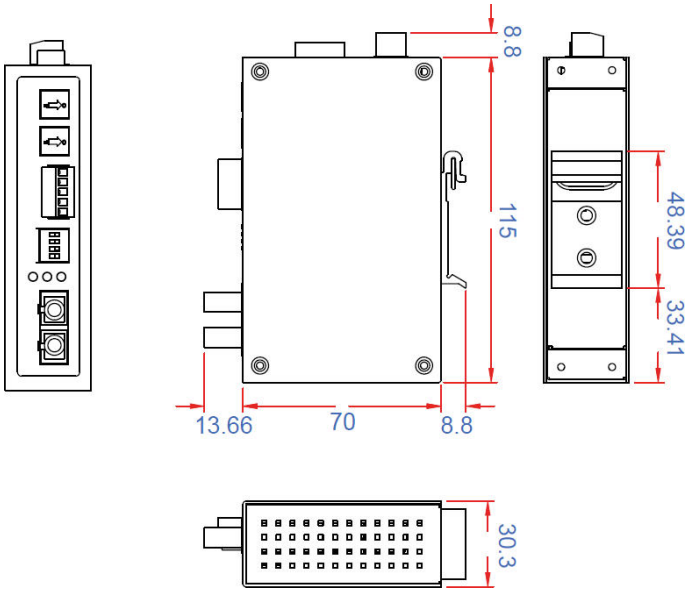- Quick installation guide (printed)
- Warranty card

NOTE: Please notify your sales representative if any of the above items are missing or damaged.
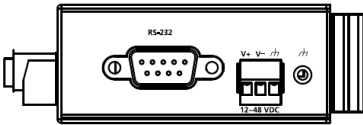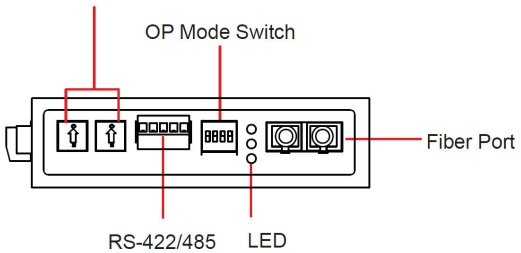
Mounting Dimensions (unit: mm)

ICF-1150-SC

ICF-1150-ST

Top View

Front View

⚠ ATTENTION

**Electrostatic Discharge Warning!**

To protect the product from damage due to electrostatic discharge, we recommend wearing a grounding device when handling your ICF-1150 product.

Mounting (in an enclosure or industrial panel)

The aluminum DIN rail attachment plate should be fixed to the back panel of the ICF-1150 when you take it out of the box. If you need to reattach the DIN rail attachment plate to the ICF-1150, make sure the stiff metal spring is situated towards the top, as shown in the figures below.

STEP 1: Insert the top of the DIN rail into the slot just below the stiff metal spring.
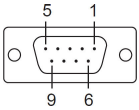
STEP 2: The DIN rail attachment unit will snap into place as shown below.
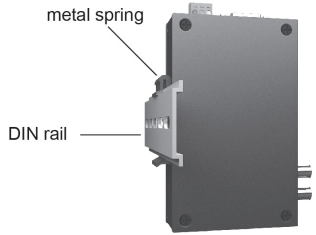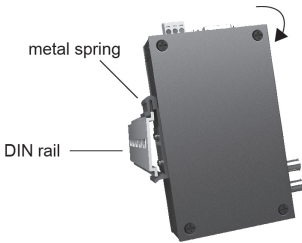
To remove the ICF-1150 series from the DIN rail, simply reverse Steps 1 and 2 above.
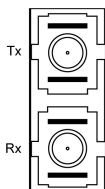
Pin Assignment

Pin	RS-232
1	–
2	TxD
3	RxD
4	–
5	GND
6	–
7	–
8	–
9	–
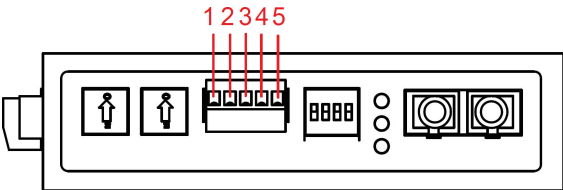
Pin	RS-422	4-wire RS-485	2-wire RS-485
1	GND	GND	GND
2	Rx-	Rx-	Data -
3	Rx +	Rx +	Data +
4	Tx -	Tx -	–
5	Tx +	Tx +	–

Fiber Cable

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

Cable Wiring

A ——————— A
B ——————— B
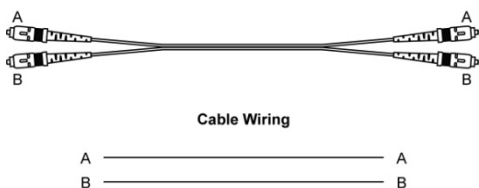
ST-Port Pinouts   **ST-Port to ST-Port Cable Wiring**

Cable Wiring

A ——————— A
B ——————— B
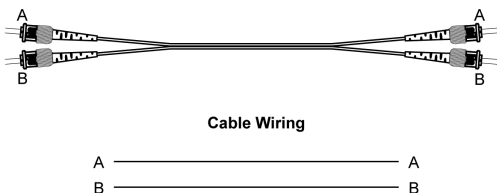
ATEX and IECEx Information

1. Certification number:
   DEMKO 10 ATEX 0917344X
   IECEx UL 13.0044X
2. Ambient range: -40°C ≤ Tamb ≤ 85°C
3. Certification string: Ex nA IIC T4 Gc
4. Standards covered: EN 60079-0:2012+A11:2013, IEC 60079-0: 6th Ed; EN 60079-15:2010   IEC 60079-15:4th Ed
5. Conditions of safe usage:
   - The equipment shall only be used in an area of not more than pollution degree 2, as defined in IEC 60664-1.
   - The equipment shall be installed in an enclosure that provides a degree of protection not less than IP54, in accordance with IEC/EN 60079-15, and accessible only by the use of a tool.
   - Transient protection shall be provided that is set at a level not exceeding 140% of the peak rated voltage value at the supply terminals to the equipment.
   - The Terminal blocks (J1, J2) are suitable for 12-28 AWG (3.31-0.08 mm^2), with torque = 4.5 lb-in. The cross-sectional area of the PE conductor is Sp=3.31 mm^2. The conductor used for grounding is same size as the power conductor.
   - Conductors suitable for use in an ambient temperature of 91°C must be used for the power supply terminal.

⚠ ATTENTION

This is a Class 1 laser/LED product. Do not stare into the laser beam.

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.

Switch Settings

There are 4 DIP switches on the front panel of the ICF-1150.

Setting	Switch 1	Switch 2
RS-422	ON	OFF
2-wire RS-485	OFF	ON
4-wire RS-485	OFF (default)	OFF (default)

Fiber Mode	Switch 3
Ring Mode	ON
Point to Point mode	OFF (default)

120Ω Terminator	Switch 4
Enable	ON
Disable	OFF (default)

⚠ For Fiber Ring Users:

If the Rx LEDs of the converter glow continuously, remove the fiber cable and then reconnect. The Rx LEDs should no longer glow continuously

NOTE: "Ring Mode" can only be used for half-duplex applications.

The S3 DIP Switch is located inside the ICF-1150. When the ICF-1150 is in RS-485 mode, use this DIP switch to configure RS-485 data direction control, data format, and baudrate. When the ICF-1150 is in RS-232/422 mode, the S3 DIP switch cannot affect RS-232/422 communication.

RS-485 Data Direction Control Settings

RS-485 Data Direction Control	S3 Pin 1
Auto Baudrate	OFF
Fixed Baudrate	ON

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Data Format	S3 Pin 2	S3 Pin 3	S3 Pin 4
7 Bits	OFF	ON	ON
8 Bits	ON	OFF	ON
9 Bits	OFF	OFF	ON
10 Bits	ON	ON	OFF
11 Bits	OFF	ON	OFF
12 Bits	ON	OFF	OFF

The serial data format includes one start bit, between five and eight data bits, and one stop bit. A parity bit and an additional stop bit might be included in the format as well.

For example, 8-N-1 is interpreted as eight data bits, no parity bit, and one stop bit. Users need to adjust the DIP switch to set the data format to 10 bits.

Baudrate	S3 Pin 5	S3 Pin 6	S3 Pin 7	S3 Pin 8	S3 Pin 9
50	OFF	ON	ON	ON	ON
75	ON	OFF	ON	ON	ON
110	OFF	OFF	ON	ON	ON
134.5	ON	ON	OFF	ON	ON
150	OFF	ON	OFF	ON	ON
300	ON	OFF	OFF	ON	ON
600	OFF	OFF	OFF	ON	ON
1200	ON	ON	ON	OFF	ON
1800	OFF	ON	ON	OFF	ON
2400	ON	OFF	ON	OFF	ON
4800	OFF	OFF	ON	OFF	ON
7200	ON	ON	OFF	OFF	ON
9600	OFF	ON	OFF	OFF	ON
19200	ON	OFF	OFF	OFF	ON
38400	OFF	OFF	OFF	OFF	ON
57600	OFF	ON	ON	ON	OFF
115200	OFF	ON	ON	ON	OFF
230400	ON	OFF	ON	ON	OFF
460800	OFF	OFF	ON	ON	OFF
921600	ON	ON	OFF	ON	OFF

LED Indicators

There are 3 LEDs on the front panel of the ICF-1150.

LED	Color	Function
PWR	Green	Steady ON: Power is ON
Fiber Tx	Green	When sending serial data from the fiber port
Fiber Rx	Yellow	When receiving data from the fiber port

Specifications

Serial Communication	
Signals for RS-232	TxD, RxD, SGND
Signals for RS-422	TxD+, TxD-, RxD+, RxD-, SGND
Signals for 4-wire RS-485	TxD+, TxD-, RxD+, RxD-, SGND
Signals for 2-wire RS-485	Data+, Data-, SGND

Baudrate	50 bps to 921.6 Kbps
ESD protection	15 kV ESD
Fiber Communication	
Connector type	ST or SC
Distance	Single-mode fiber for 40 km
	Multi-mode fiber for 5 km
Support Cable	Single mode:
	8.3/125, 8.7/125, 9/125 or 10/125 µm
	Multi-mode:
	50/125, 62.5/125, or 100/140 µm
Wavelength	ICF-1150-S: 1310 nm
	ICF-1150-M: 850 nm
TX Output	ICF-1150-S: > -8 dBm
	ICF-1150-M: > -8 dBm
RX Sensitivity	ICF-1150-S: -25 dBm
	ICF-1150-M: -25 dBm
Point-to-Point Transmission	Half or Full duplex
Multi-drop Transmission	Half duplex, fiber ring
Environmental	
Operating Temperature	0 to 60°C (32 to 140°F), 5 to 95 % RH
	-40 to 85°C (-40 to 185°F) for –T Model
Storage Temperature	-40 to 85°C (-40 to 185°F), 5 to 95 % RH
Power	
Input Power Voltage	12 to 48 VDC, 300 mA (Max.) Class 2
Power Line Protection	4 kV Burst (EFT), EN61000-4-4
	4 kV Surge, EN61000-4-5
Reverse Power Protection	Protects against V+/V- reversal
Over Current Protection	Protects against 2 signals shorted
	together: 1.1 A
Power Consumption	ICF-1150-S/M-SC/ST: 246 mA @ 12 V
	ICF-1150I-S/M-SC/ST: 300 mA @ 12 V
Physical Characteristics	
Dimensions (W × D × H)	30.3 × 70 × 115 mm
Material	Aluminum (1 mm)
Gross Weight	ICF-1150 : 118g
	ICF-1150I : 135g
Regulatory Approvals	
CE	Class A
FCC	Part 15 sub Class A
LVD	EN 60950-1
EMI	EN55032 1998, Class A
EMS	EN 61000-4-2 (ESD): Contact: 8 kV; Air:
	15 kV EN 61000-4-3 (RS): 80 MHz to 1
	GHz: 3 V/m
	EN 61000-4-4 (EFT): Power: 4 kV; Signal:
	1 kV EN 61000-4-5 (Surge): Power: 4 kV;
	Signal: 1 kV EN 61000-4-6 (CS): 150 kHz
	to 80 MHz: 3 V/m EN 61000-4-8 (PFMF)
Freefall	IEC 60068-2-32
MTBF	ICF-1150 : 2,298,766 hrs
	ICF-1150I : 1,770,450 hrs
Hazardous Certifications	
ATEX	10 ATEX 0917344X
IECEx	IECEx UL 13.0034X

Pay specific attention to the following:

1. For indoor use and pollution degree II, wipe with a dry cloth when cleaning up the labeling.
2. Please use qualified power supply by SELV or double insulation of UL60950 or UL61010-1 or UL61010-2-201 standards.
3. UL61010-2-201: Shall be mounted in the Industrial Control Panel and the ambient temperature should not exceed 75 degree Celsius.
4. If the equipment is used in a manner not specified by the manufacturer, then the protection provided by the equipment may be impaired.
5. We suggest using the cable type 24 AWG (American Wire Gauge) and the corresponding pin type cable terminals.
6. We suggest using a torque value of 6.5 lb-in; do not use excessive force when fixing wiring
7. Address of manufacturer: No. 1111, Heping Rd., Bade Dist., Taoyuan City 334004, Taiwan