IVN-8561 Getting Started

Contents

Overview

This document describes how to begin using the IVN-8561 100BASE-T1 Media Converter. The IVN-8561 is a two-channel, four-port media converter that converts data between 100BASE-TX Ethernet and 100BASE-T1 Automotive Ethernet with minimal latency.

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Safety Guidelines

Operate the IVN-8561 only as described in this document.

> ⚠ **Caution** This icon denotes a caution advising you to take precautions to avoid injury.

> ⚠ **Caution** Do not operate the IVN-8561 in a manner not specified in this document. Product misuse can result in a hazard. You can compromise the

> safety protection built into the product if the product is damaged in any way. If the product is damaged, return it to NI for repair.

Electromagnetic Compatibility Guidelines

This product was tested and complies with the regulatory requirements and limits for electromagnetic compatibility (EMC) stated in the product specifications. These requirements and limits provide reasonable protection against harmful interference when the product is operated in the intended operational electromagnetic environment.

This product is intended for use in industrial locations. However, harmful interference may occur in some installations, when the product is connected to a peripheral device or test object, or if the product is used in residential or commercial areas. To minimize interference with radio and television reception and prevent unacceptable performance degradation, install and use this product in strict accordance with the instructions in the product documentation.

Furthermore, any changes or modifications to the product not expressly approved by National Instruments could void your authority to operate it under your local regulatory rules.

Electromagnetic Compatibility

CE Compliance $C\,\epsilon$

This product meets the essential requirements of applicable European Directives, as follows:

- 2014/35/EU; Low-Voltage Directive (safety)
- 2014/30/EU; Electromagnetic Compatibility Directive (EMC)
- 2011/65/EU; Restriction of Hazardous Substances (RoHS)
- 2014/53/EU; Radio Equipment Directive (RED)
- 2014/34/EU; Potentially Explosive Atmospheres (ATEX)

Product Certifications and Declarations

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for NI

products, visit ni.com/product-certifications, search by model number, and click the appropriate link.

Unpacking the Kit

> (!) **Notice** To prevent electrostatic discharge (ESD) from damaging the device, ground yourself using a grounding strap or by holding a grounded object, such as your computer chassis.

1. Touch the antistatic package to a metal part of the computer chassis.
2. Remove the device from the package and inspect the device for loose components or any other sign of damage.

   > (!) **Notice** Never touch the exposed pins of connectors.

   > ✎ **Note** Do not install a device if it appears damaged in any way.

3. Unpack any other items and documentation from the kit.

Store the device in the antistatic package when the device is not in use.

Verifying the Kit Contents

Verify the following components are in your kit.

- IVN-8561, 100BASE-T1 Media Converter
- USB cable assembly, Type-C (male) to Type-A (female), 1 m
- Connector plug (QTY 2)
- Screwdriver, 2 mm, flathead
- Documentation

Power Requirements

Input voltage range	5 VDC nominal; USB 3.0 Type C
Max power consumption	2.8 W

Preparing the Environment

Ensure that the environment in which you are using the IVN-8561 meets the following specifications.

Ambient temperature range	-20 °C to 55 °C (Tested in accordance with IEC 60068-2-1 and IEC 60068-2-2.)
Relative humidity range	10% to 90%, noncondensing (Tested in accordance with IEC 60068-2-56.)
Maximum Altitude	2,000 m (800 mbar)
Pollution Degree	2

Indoor use only.

> **Note** Refer to the device specifications on http://www.ni.com/manuals for complete specifications.

Hardware Overview

The IVN-8561 has a total of four communication ports, and one USB port for power.

Ports 1 and 3 are 100BASE-T1 ports for Automotive Ethernet connections using two-position terminal blocks. Ports 2 and 4 are 100BASE-TX ports for Ethernet connections using 8-pin, modular RJ-45 connectors.

The 100BASE-T1 interfaces use an NXP TJA1100 100 Mbit/s BroadR-Reach-compliant PHY. Weidmuller OMNIMATE SL-SMT 3.50/02/90LF terminal block headers are used to connect to these ports. Compatible plugs are included with the IVN-8561.

Each 100BASE-T1 port can be configured as master or slave, using switches on the front panel.

The power connector is USB Type-C. Use the USB cable (Type-C to Type-A) included with the IVN-8561 to power the device from a standard USB 3.0 port on your computer or industrial controller. The IVN-8561 can be powered from the USB port of any NI PXI, CompactRIO, or industrial controller.

Cabling Requirements

Cabling for port 1 and port 3 connections must be 100BASE-T1 compliant, shielded or unshielded twisted pair cable, with a maximum length of 15 m and cable impedance of 100 Ω ±10%. Cabling for port 2 and port 4 connections must be Cat 5e or higher Ethernet cable.

LEDs

LEDs on the left side of the front panel indicate Link and Activity on the 100BASE-T1 Automotive Ethernet ports. LEDs on the RJ45 connectors indicate Link, Activity, and 100 Mbit speed on the 100BASE-TX Ethernet ports.

Table 1. LED Indicators

LED	LED State	Behavior
POWER	On	Power on
	Off	Power off
P1 LINK/ACT	Steady	Link established on port 1, no activity
	Blinking	Link established on port 1, activity present
	Off	No link established on port 1
P3 LINK/ACT	Steady	Link established on port 3, no activity
	Blinking	Link established on port 3, activity present
	Off	No link established on port 3
Port 2 LINK/ACT	Steady	Link established on port 2, no activity
	Blinking	Link established on port 2, activity present
	Off	No link established on port 2
Port 2 100	Steady[1]	100 Mbit link speed selected on port 2
	Off[2]	10 Mbit speed selected on port 2
Port 4 LINK/ACT	Steady	Link established on port 4, no activity

LED	LED State	Behavior
	Blinking	Link established on port 4, activity present
	Off	No link established on port 4
Port 4 100	Steady[1]	100 Mbit link speed selected on port 4
	Off[2]	10 Mbit speed selected on port 4

Master/Slave Switches

Switches on the left side of the front panel control master/slave selection for the 100BASE-T1 Automotive Ethernet ports.

Switch	Description	Position
P1 MASTER/SLAVE	100BASE-T1 port 1 master/slave selection	Up: Master mode selected Down: Slave mode selected
P3 MASTER/SLAVE	100BASE-T1 port 3 master/slave selection	

To establish a link between two 100BASE-T1 ports, one port must be configured as master and the other as slave. The IVN-8561 allows you to establish a link with a port in any configuration by selecting the appropriate mode with the front panel switch.

When you change the MASTER/SLAVE switch selection, the IVN-8561 immediately changes the configuration and resets the corresponding 100BASE-T1 and 100BASE-TX ports for that channel. The master/slave configuration of one channel can be changed without affecting the other.

DIN Rail Mounting

The NI 9913 DIN rail mounting kit (part number 781740-01) contains one clip for mounting the IVN-8561 on a standard 35 mm DIN rail. The four holes on the bottom of the IVN-8561 allow the device to be mounted in multiple orientations.
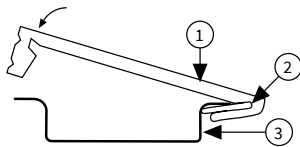
Fasten the DIN rail clip to the IVN-8561 using two FLH #6-32 x 5/16" screws (included in the kit) with a #2 Phillips screwdriver, as shown in the following figure.

Figure 1. DIN Rail Clip Installation
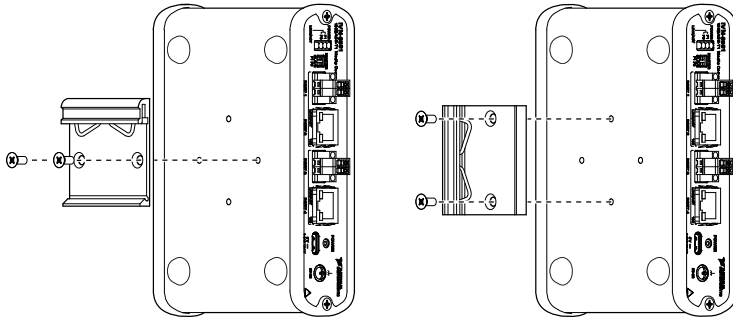
Clip the chassis onto the DIN rail with the larger lip of the DIN rail clip positioned up, as shown in the following figure.

Figure 2. DIN Rail Clip Parts Locator Diagram

1. DIN Rail Clip
2. DIN Rail Spring
3. DIN Rail

> **Note** Use only the screws provided in the DIN rail kit. Using longer screws may damage the IVN-8561.

Wiring the IVN-8561

Terminal block headers are used to connect to the 100BASE-T1 ports. Compatible plugs are included with the IVN-8561. Attach these plugs to twisted pair cabling to connect a 100BASE-T1 network to ports 1 or 3 of the IVN-8561.

Pin Assignments

Refer to the following tables for descriptions of the terminal block (100BASE-T1) and RJ45 (100BASE-TX) pin assignments.

Table 2. 100BASE-T1 Terminal Block Pin Assignments

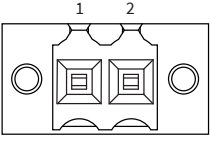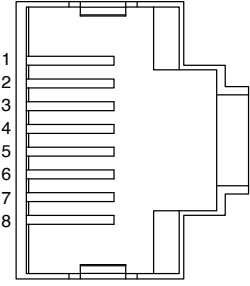| Connector	Pin	Signal
	1	100BASE-T1 Positive (+)

Connector	Pin	Signal
	2	100BASE-T1 Negative (-)

Table 3. 100BASE-TX RJ45 Pin Assignments

Connector	Pin	Signal
	1	Transmit+
	2	Transmit-
	3	Receive+
	4	No Connection (NC)
	5	NC
	6	Receive-
	7	NC
	8	NC

Connecting the IVN-8561

Connect the IVN-8561.

1. Use twisted pair cable and the provided terminal blocks to connect your 100BASE-T1 network to ports 1 or 3 of the IVN-8561.

2. Use a Cat 5e Ethernet cable to connect 100BASE-TX network to ports 2 or 4 of the IVN-8561.

> **Note** 100 Mbit link speed must be selected for ports 2 and 4, indicated by the LED next to the port.

3. Connect one end of the USB power cable to the IVN-8561, and connect the other end to a standard USB 3.0 port.

4. Optionally, use the ground screw on the IVN-8561 to attach a ground cable.

Functional Diagram

100BASE-T1 is the standard for 100 Mbit/s Automotive Ethernet. The physical connection consists of an unshielded twisted pair cable over which two connected nodes transmit and receive simultaneously in point-to-point full-duplex operation. The IVN-8561 provides two channels to convert data between 100BASE-TX Ethernet and 100BASE-T1 Automotive Ethernet. Each channel consists of one port for 100BASE-T1 communication and one port for 100BASE-TX communication. The IVN-8561 uses a two-position terminal block to connect a 100BASE-T1 Automotive Ethernet system to the device.

Figure 3. IVN-8561 Connected to 100BASE-T1 and 100BASE-TX Networks
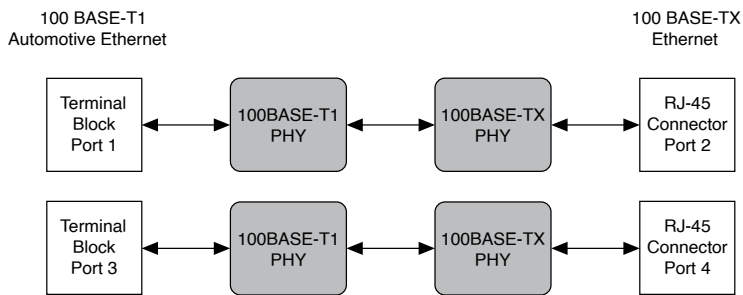
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