TECHNICAL DATASHEET #TDAX140970

Dual CAN FD to Ethernet Converter

High-Speed Classic CAN, ISO CAN FD, and Non-ISO CAN FD
Real-Time Operating System (RTOS) for Low Latency
P/N: AX140970

Features

- 12 Vdc, 24 Vdc input power (nominal) for connection to a battery
- 2 isolated CAN ports supporting High-Speed Classic CAN, ISO CAN FD and Non-ISO CAN FD
- 1 Ethernet port supporting data rate up to 100 Mbit/s
- Runs on Real-Time Operating System (RTOS) for low latency
- 2 power outputs (Vps) to power an external device over CAN
- Protection against surge, reverse polarity, input overvoltage, output overcurrent, output short to Battery or Ground
- Power, link/activity, and speed LED indicators
- 1 8-pin M12 connector, 2 5-pin M12 connectors
- Compact, IP67
- Web Server Interface for configuration

Applications

- Off-highway road machinery
- Harsh environments with power transients and high humidity, vibrations, and shock

Ordering Part Numbers

Dual CAN FD to Ethernet Converter P/N: **AX140970**

The Converter can be purchased together with one AX070531 and two AX070532 cables as a kit under P/N **AX140970K**.

Accessories:
AX070531 Ethernet and Power Cable - 1.7 m (5.5 ft.), 8-pin M12 A-coded, Unterminated Leads, Ethernet Jack
AX070532 CAN Cable - 1.5 m (5 ft.), 5-pin M12 A-coded, Unterminated Leads
AX140910 Software Support Package (SSP) Version 3.0.0+
Ethernet to CAN Converter Discovery Application (AxioDisc.exe)
The software can be downloaded from https://www.axiomatic.com/customer-downloads/. Please contact sales@axiomatic.com for password.

Description

The Dual CAN FD to Ethernet Converter is a simple device converting Classic CAN or CAN FD frames into UDP or TCP IP datagrams and sending them over the Ethernet network. The device can also convert UDP or TCP datagrams into Classic CAN or CAN FD frames and transmit them through any of the two CAN FD ports. It runs on Real-Time Operating System (RTOS) for low latency.

The converter has two galvanically isolated independent CAN FD ports and one Ethernet port. The CAN FD ports support High-Speed Classic CAN with data rate up to 1Mbit/s or CAN FD with data rate up to 8 Mbit/s. The Ethernet port provides up to 100Mbit/s data rate.

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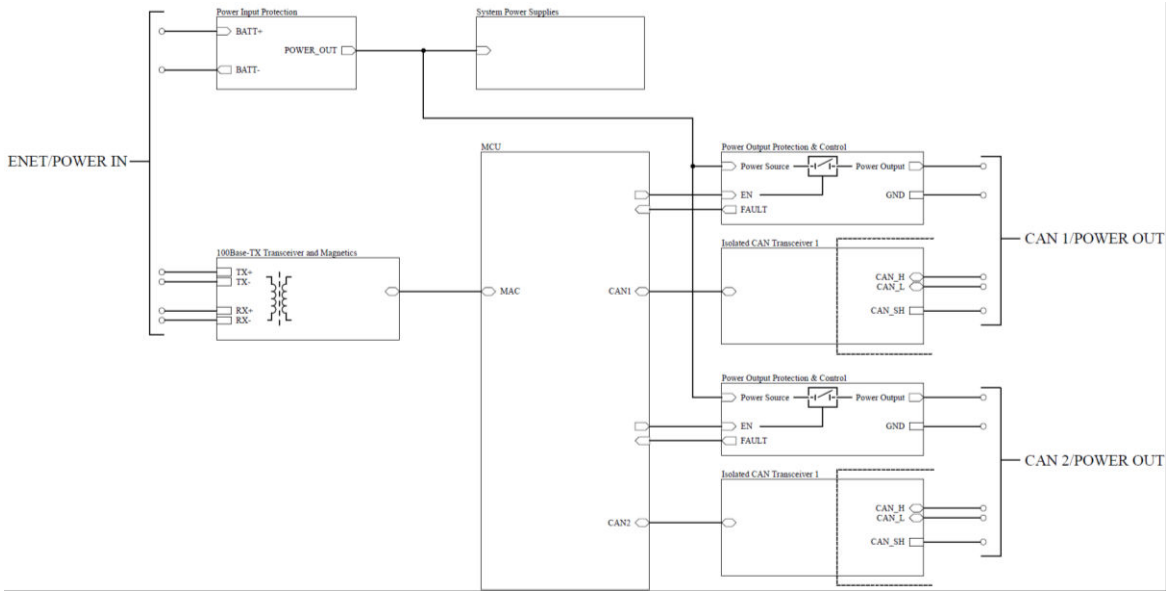
All types of Classic CAN and CAN FD frames are supported. CAN FD ports can operate either in ISO or in Bosch frame format in the Flexible Data-rate (FD) mode. Power can be passed through to the CAN port connector. Protection is provided.

The converter contains a web server to setup configuration parameters and monitor the internal state of the converter using a web browser. The user can also update the converter firmware using the web browser.

A simple command-line `AxioDisc.exe` Windows application is provided to locate a converter on the LAN.

To ensure low latency in processing CAN and Ethernet messages, the converter software runs under control of a real-time operating system.

Functional Block Diagram



Technical Specifications

Specifications are indicative and subject to change. Actual performance will vary depending on the application and operating conditions. Users should satisfy themselves that the product is suitable for use in the intended application. All our products carry a limited warranty against defects in material and workmanship. Please refer to our Warranty, Application Limitations & Return Materials Process as described on https://www.axiomatic.com/service/.

Input

The power supply input is located on the Ethernet connector. It uses automotive battery power[1].

Parameter	Value	Remarks
Supply Voltage	9 to 36 Vdc	12 V, 24 V – nominal
Quiescent Current[2]	150 mA 75 mA	12 V – typical 24 V – typical
Protection	Undervoltage Overvoltage Reverse Polarity Transients/Surge	Hardware shutdown at 6 V Hardware shutdown at 37.7 V Up to -36 V

[1]The power supply is not compatible with the PoE (Power over Ethernet) IEEE 802.3 standard.
[2]Both CAN ports are ON, no CAN traffic. Ethernet is not connected.

Output

Parameter	Value	Remarks
Voltage Output	9 to 36 Vdc	Pass-through voltage from the power supply input
Current Output	0.7 A	Maximum pass-through current
Voltage Drop	1.5 V	Maximum
Protection	Overcurrent at ~1A with auto-retry Short to Battery/Ground	

The Power Pass-Through supply output is located on the CAN connector.

Ethernet Port

Parameter	Value	Remarks
Number of Ports	1	Ethernet, ESD, EFT Protected
Port Type	10BASE-T, 100BASE-TX	Auto-configuration and full-duplex supported
MDIX	Auto-MDIX	Auto-crossover to eliminate cabling mismatch
LED Indicators	Speed/Activity	Green LEDs 1. POWER 2. 10/100 LED: Off = 10 Mbit/s On = 100 Mbits/s 3. LINK/ACT LED: Off = No link Solid = Link Blinking = Activity on ethernet
Protocols	Ethernet IEEE 802.3, IP, ICMP, ARP, UDP, TCP, HTTP, Proprietary[1]	CAN messages are transmitted using a proprietary application protocol running on top of the user selectable UDP or TCP transport protocol [1] The internal web server uses HTTP protocol. The unit supports a proprietary discovery protocol [2]
Server Mode	Up to 10 bi-directional simultaneous connections	Up to 9 connections, if the Client mode is enabled
Client Mode	1 remote bi-directional connection	Auto-connect to a remote server, if connection is dropped or temporarily unavailable. Client mode can be disabled
Web server	Provided	Always enabled for converter configuration and diagnostics
Internal Diagnostics	Health Status[1]	Internal health status of the converter is transmitted in heartbeat messages [3]. It is also available from the web server

[1]Supported by *CAN-ENET Software Support Package* (SSP), P/N **AX140910**, v3.0.0+.

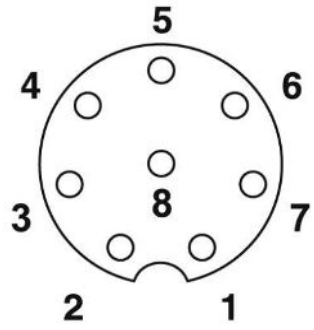
Reference documents describing proprietary protocols and *Health Status* field format are presented below. The documents are available upon request.

Reference Number	Document Name
[1]	O. Bogush, "Ethernet to CAN Converter Communication Protocol. Document version: 5", Axiomatic Technologies Corporation, December 14, 2022
[2]	O. Bogush, "Ethernet to CAN Converter Discovery Protocol. Document version: 1A", Axiomatic Technologies Corporation, April 5, 2021
[3]	O. Bogush, "Ethernet to CAN Converter Health Status. Document version: 3", Axiomatic Technologies Corporation, April 5, 2021

Ethernet Connector

M12 socket, 8-pin, A-coded, female connector, Phoenix Contact, P/N: **1441817**.

PIN #	Description
1	PWR_IN
2	PWR_IN_GND
3	PWR_IN_GND
4	TX_N
5	RX_P
6	TX_P
7	PWR_IN
8	RX_N



Use A-coded mating connectors compliant with IEC 61076-2-101:2012.
P/N **AX070531** Ethernet and Power Cable - 1.7 m (5.5 ft.), 8-pin M12 A-coded, Unterminated Leads, Ethernet Jack, can be used for experimenting. The cable is rated for -40°C to 75°C.

CAN FD Ports

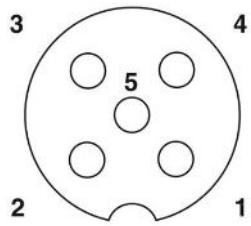
Parameter	Value	Remarks
Number of Ports	2	Individually galvanically Isolated, ESD, EFT protected. Twisted pair, CiA 601-6. Shield connection is provided if shielded cable is used. No internal terminating 120 Ω resistor
Port Type	Classic CAN	High-Speed CAN with up to 1 Mbit/s bit rate and up to 8-byte data payload per frame, ISO11898-1 (Bosch CAN 2.0A and B)
	ISO CAN FD	CAN FD frame format according to ISO11898-1:2015. Up to 1Mbit/s arbitration, up to 8Mbit/s data phase bit rate
	Non-ISO CAN FD	CAN FD frame format according to Bosch CAN FD Specification V1.0. Up to 1Mbit/s arbitration, up to 8Mbit/s data phase bit rate
Baud Rate	1000 kbit/s, 800 kbit/s, 666.6(6) kbit/s, 500 kbit/s, 250 kbit/s, 125 kbit/s, 100 kbit/s, 83.3(3) kbit/s, 50 kbit/s, 20 kbit/s, 10 kbit/s	For Classic CAN only
Frame Filtering	5 CAN ID Range Filters 5 CAN Mask Filters	Per channel, can be disabled. All types of Classic and CAN FD frames are supported.

CAN network requires two 120 Ω terminating resistors, one on each side of the CAN bus.

CAN Connector 1

M12 socket, 5-pin, A-coded, female connector, Phoenix Contact, P/N: **1441778**.

Pin	Description
1	CAN1_SHIELD
2	POUT1
3	GND1
4	CAN1_H
5	CAN1_L

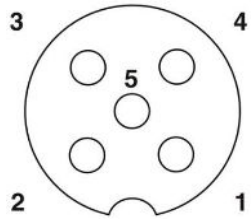


Use mating A-coded connectors compliant with IEC 61076-2-101:2012.
AX070532 CAN Cable - 1.5 m (5 ft.), 5-pin M12 A-coded, Unterminated Leads, can be used for experimenting. The cable is rated for -40°C to 105°C.

CAN Connector 2

M12 socket, 5-pin, A-coded, female connector, Phoenix Contact, P/N: **1441778**.

Pin	Description
1	CAN2_SHIELD
2	POUT2
3	GND2
4	CAN2_H
5	CAN2_L

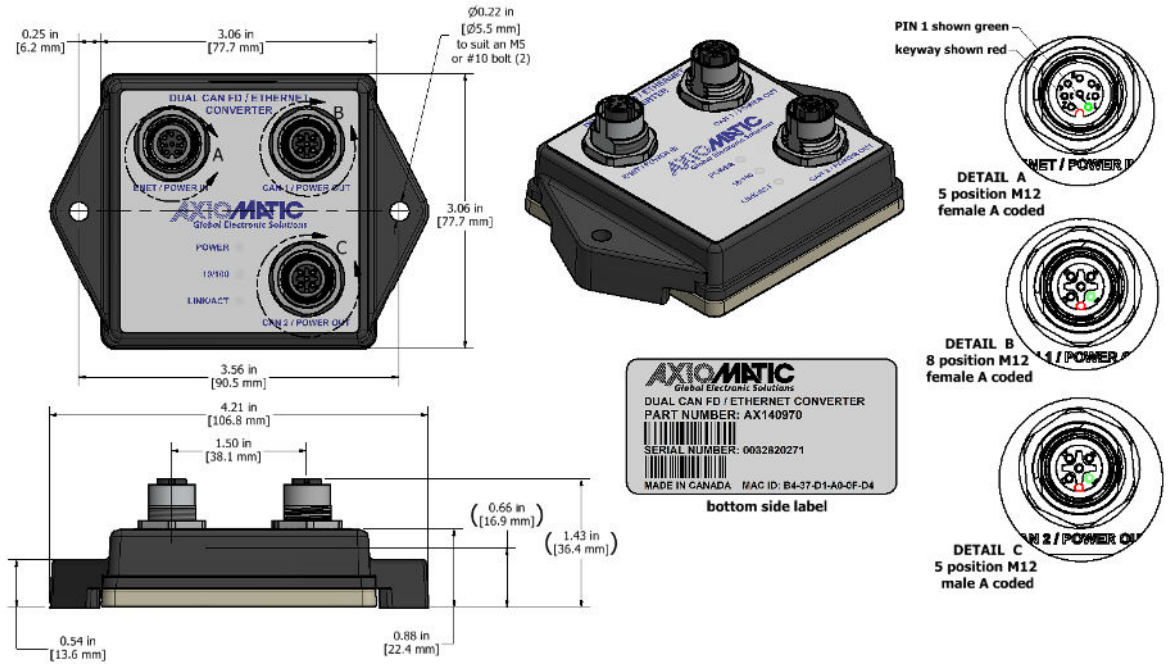


Use mating A-coded connectors compliant with IEC 61076-2-101:2012.
AX070532 CAN Cable - 1.5 m (5 ft.), 5-pin M12 A-coded, Unterminated Leads, can be used for experimenting. The cable is rated for -40°C to 105°C.

General Specifications

Parameter	Value	Remarks
Operating System	RTOS	Real-Time Operating System
Operating Temperature	-40°C to 75°C	-40°F to 167°F
Storage Temperature	-40°C to 85°C	-40°F to 185°F
Environmental Protection	IP67	IEC 60529. With mated connectors
Compliance	RoHS Directive	
Enclosure Size and Material	4.21 in x 3.06 in x 1.43 in (106.8 mm x 77.7 mm x 36.4 mm) Injection molded enclosure and cover. Laser welded. PA66, 30% glass fiber reinforced Flammability rating: UL 94 HB	L x W x H including connectors. See dimensional drawing.
Weight	0.25 lb. (0.12 kg)	
Vibration	10 g peak (Sine component) 7.56 Grms (Random component)	MIL-STD-202H, method 204D, test condition C MIL-STD-202H, method 214A, test condition I/B
Shock	50 g peak	MIL-STD-202H, method 213B, test condition A

Dimensional Drawing



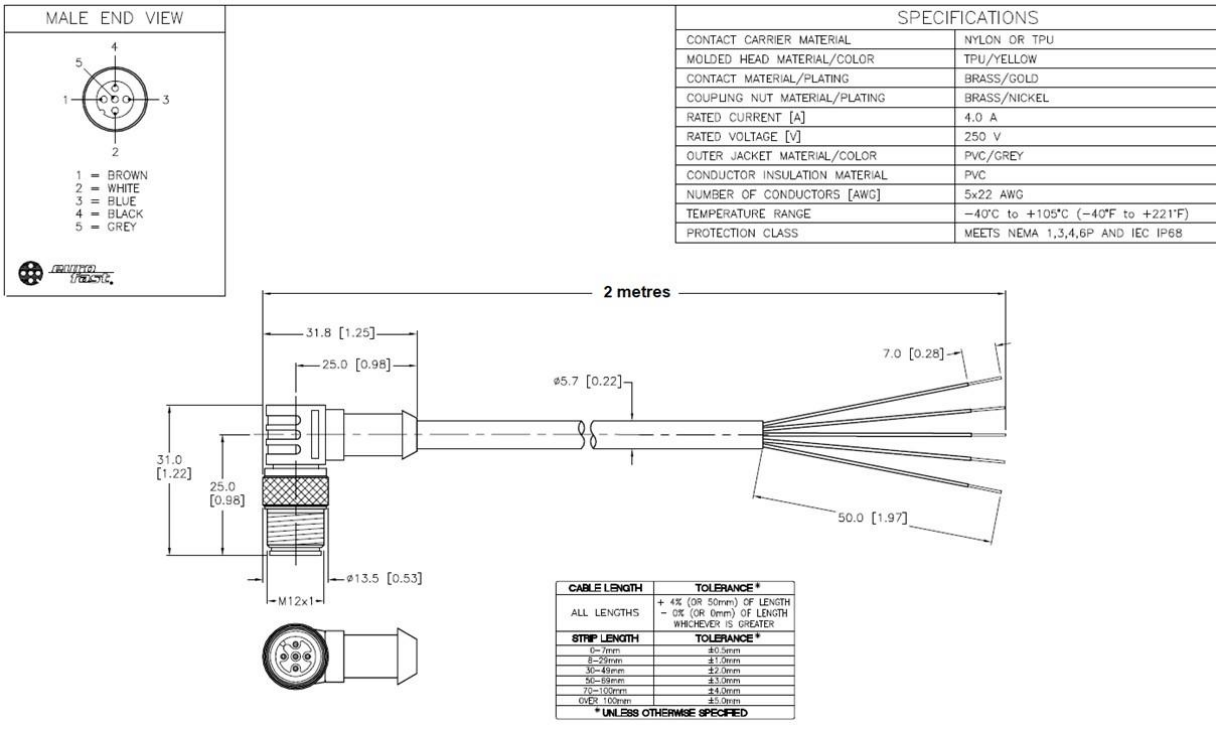


Figure 1.0. AX070532 Mating Cable

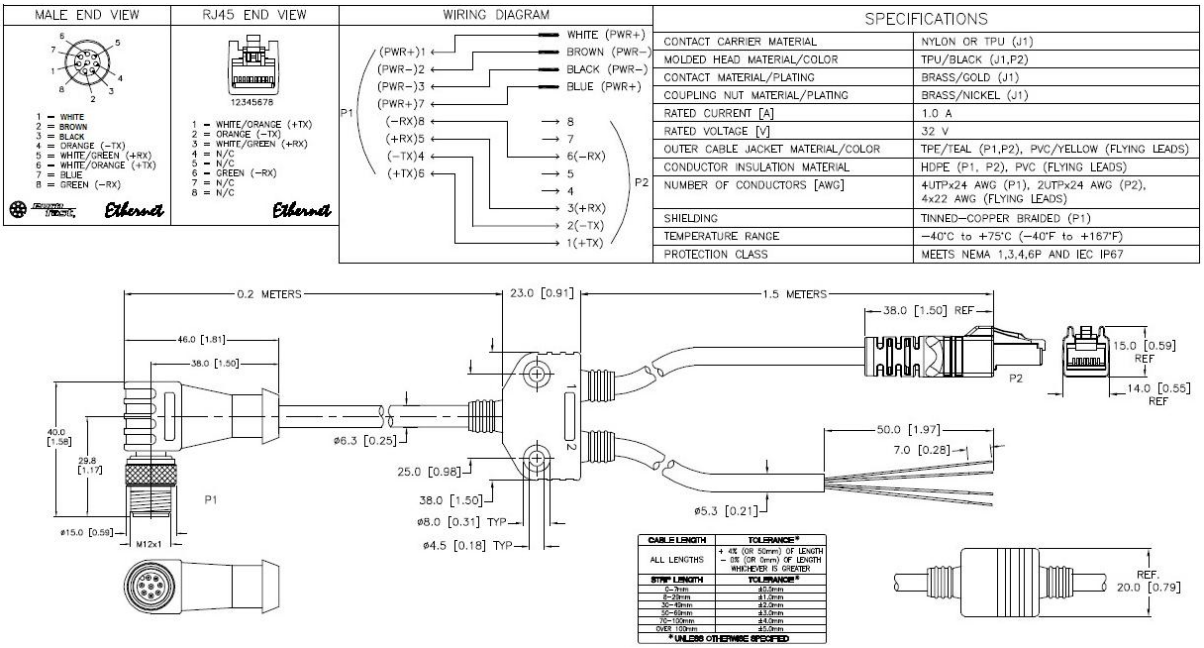


Figure 2.0. AX070531 Mating Cable

Form: TDAX140970-06/19/2025