

Gigabit Automotive Ethernet/Ethernet Converter

P/N: AX141520

Features

- 12V, 24Vdc input power (nominal) for connection to a battery
- 1 Automotive Ethernet port (1000 Mbps)
- 1 Ethernet port (1000 Mbps)
- Power, Link and Activity LED indicators
- Surge, reverse polarity, input overvoltage, and input undervoltage protection
- Configuration via web interface for Master or Slave functionality
- IP67
- Compact, 2 M12 connectors
- Suitable for high vibration and shock environments



Applications

- Off-highway equipment, mining equipment, industrial trucks

Ordering Part Number

Gigabit Automotive Ethernet Converter: **AX141520**

Accessories:

AX070535: Ethernet Cable 2 m (6.5 ft.), 8-pin M12 A-coded, Ethernet Jack

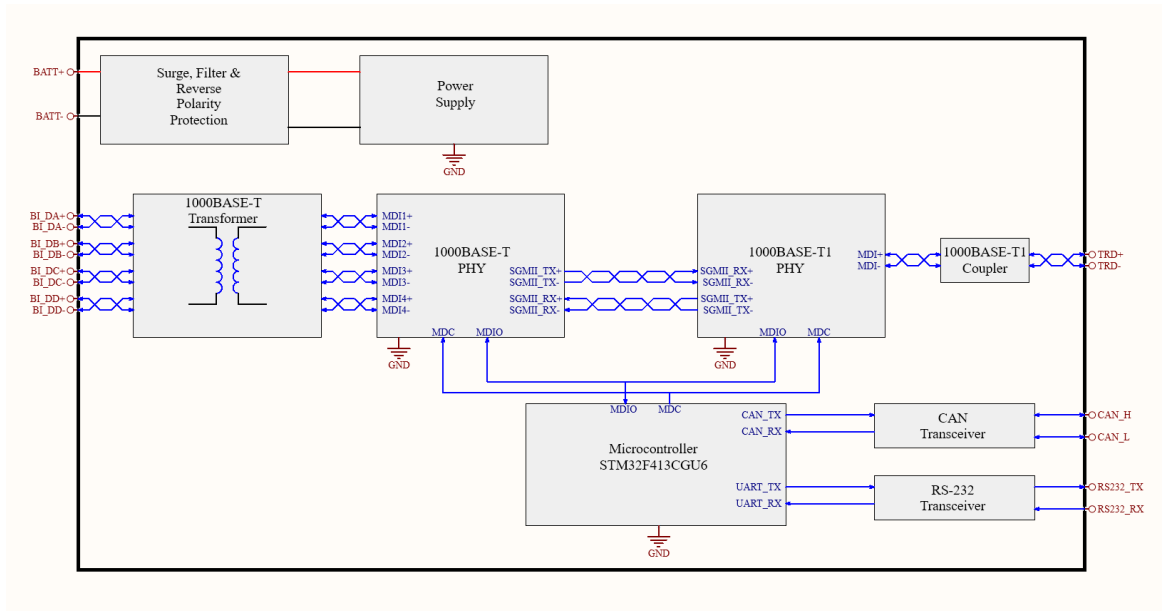
AX070533: Cable 1.5 m (5 ft.), 12-pin M12 A-coded, Unterminated Leads

Description

The Axiomatic Gigabit Automotive Ethernet to Ethernet Converter provides a purely physical, bi-directional conversion between Automotive Ethernet (1000BASE-T1), and Ethernet (1000BASE-TX) via PHY transceivers. No packets are stored or modified in this device. The converter supports a baud rate of 100 and 1,000 Mbit/s. Status LEDs provide information on connection link, and communication. The converter is designed for the harsh environments of off-highway or industrial equipment. Automotive Ethernet networks use a 2 wire, unshielded, twisted pair (UTP) cable. Using Automotive Ethernet saves cabling costs for the machine builder.

The unit will be configured via the RS-232 port to act as a Master or Slave for Automotive Ethernet. The Master mode works if the connected device has its transceiver set to slave mode. The Slave mode works when the connected device has its transceiver set to master mode. Hard setting the master/slave relationship saves on setup-time costs and ensures that the Automotive Ethernet link is established quickly. As a comparison, regular Ethernet converters rely on auto-negotiation to determine master and slave.

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 Approvals/Limitations and Return Materials Process as described on <https://www.axiomatic.com/service/>.

Input

Power Supply Input - Nominal	12V, 24Vdc nominal (9...30VDC power supply range)
Protections	Surge protection is provided. Reverse polarity protection up to -30V is provided. Input overvoltage (45V) and input undervoltage (6V) protection are provided. The unit is designed for 12Vdc based load dump.
Power Consumption	135 mA @ 12 V; 70 mA @ 24V typical
Power LED	GREEN= Power ON

Automotive Ethernet

Port Type	1 port 1000BASE-T1 (IEEE 802.3 ab compliant) Automatic Polarity Correction (for 1000 Mbps mode) Note: For 100 Mbps mode, polarity correction is not functional. Default configuration: Slave (Master mode is configurable via web interface)												
PHY	Marvell 88Q2112 (100BASE-T1/1000BASE-T1)												
LED's	2 GREEN LEDs for Automotive Ethernet Automotive Ethernet LEDs: <table border="1" data-bbox="589 1522 1383 1627"> <thead> <tr> <th>LED</th> <th>ON</th> <th>BLINK</th> <th>OFF</th> </tr> </thead> <tbody> <tr> <td>Link</td> <td>Full Link, AutoEth <-> Eth</td> <td></td> <td>No Link</td> </tr> <tr> <td>Activity</td> <td>AutoEth Link</td> <td>Activity</td> <td>No Activity</td> </tr> </tbody> </table> Activity: Receive/Transmit	LED	ON	BLINK	OFF	Link	Full Link, AutoEth <-> Eth		No Link	Activity	AutoEth Link	Activity	No Activity
LED	ON	BLINK	OFF										
Link	Full Link, AutoEth <-> Eth		No Link										
Activity	AutoEth Link	Activity	No Activity										
Protection	ESD protection for signal lines												
Protocol	Automotive Ethernet Ethernet IEEE 802.3bw for 100BASE-T1 Ethernet IEEE 802.3bp for 1000BASE-T1												

Ethernet Port

Port Type	1 port 1000BASE-T (IEEE 802.3 bp compliant) Auto-Negotiation Automatic Polarity Correction		
MDIX	Auto-MDI/MDIX (crossover)		
PHY	Marvell 88EA1512 (1000BASE-T, 100BASE-TX)		
Connections	Connector Pins	MDI	MDIX (Crossover)
	6/4	BI_DA±	BI_DB±
	5/8	BI_DB±	BI_DA±
	1/7	BI_DC±	BI_DD±
	2/3	BI_DD±	BI_DC±
Protocol	Ethernet IEEE 802.3		
Protection	ESD protection for signal lines		

Interfaces

CAN	1 CAN (SAE J1939) port – Not Used
User Interface for Reflashing	RS-232
RS-232	1 3-wire RS-232 port Maximum Baud Rate: 400 kBit/s ESD and EFT protection for signal lines
RS-232 User Interface	Any terminal emulator that supports serial communication. For Axiomatic use only

General Specifications

Functionality	Model AX141520 can be configured to acts as a master or a slave.
Microcontroller	STM32F413CGU6
Compliance	ISO 13766-1 pending CE marking pending
Vibration	MIL-STD-202H, method 214A, test condition I/B Random Vibration: 7.56 Grms (8 hr/axis in X, Y axes) MIL-STD-202H, method 204D, test condition C Sinusoidal Component: 10 g Sine sweep (8 hr/axis in X, Y axes)
Shock	MIL-STD-202H, method 213B, test condition A 50 g, 8 impacts per test, 9 ms impact duration
Operating Conditions	-40 to 60°C (-40 to 140°F) Please see temperature ratings of cables under Mating Wire Harnesses.
Storage Temperature	-40 to 85°C (-40 to 185°F)
Protection	IP67
Weight	0.20 lb. (0.091 kg)
Installation	The typical maximum wire harness length for Automotive Ethernet cabling is 15 m.
Enclosure and Dimensions	See dimensional drawing. Nylon 6/6, 30% glass fill Ultrasonically welded Flammability rating: UL 94V-0

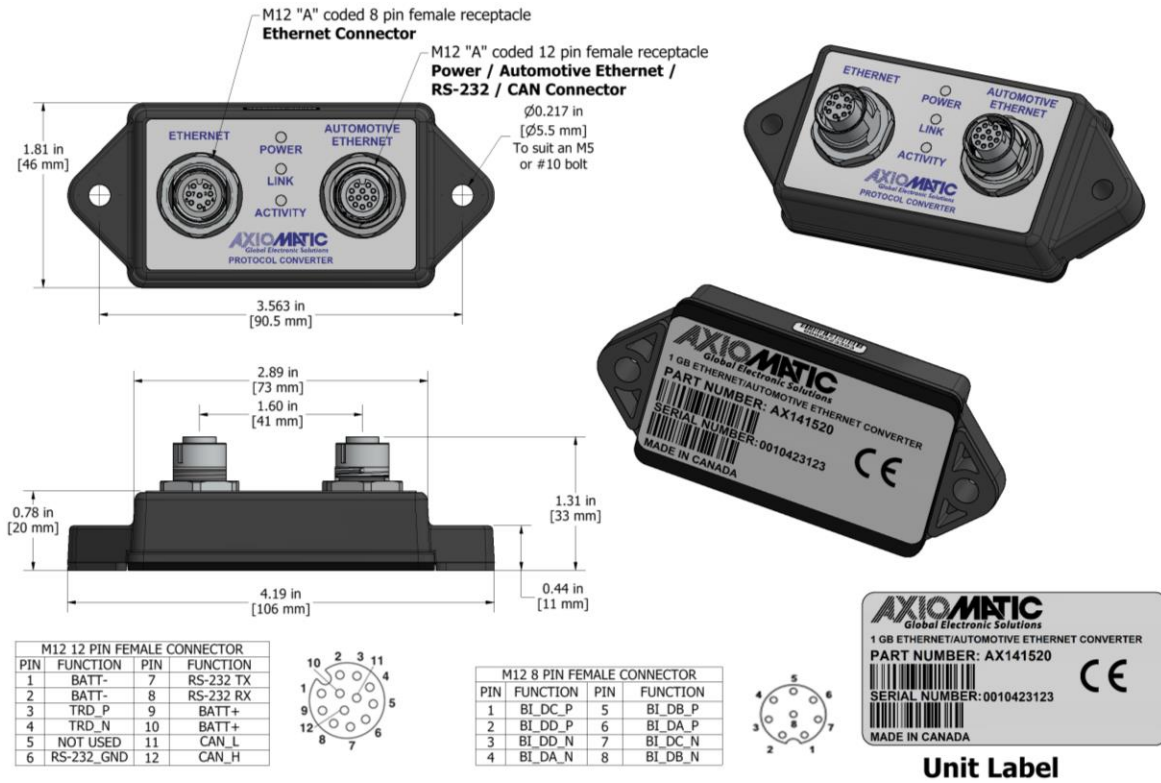


Figure 2.0. Dimensional Drawing

Electrical Connections																											
<p>POWER/ Automotive Ethernet/ RS-232 / CAN Connector 1 Phoenix Contact M12 12-pin connector (A-coded), Female P/N: 1441833 (Connector J2 on the left-hand side)</p> <table border="1"> <thead> <tr> <th>PIN#</th> <th>Description</th> </tr> </thead> <tbody> <tr><td>1</td><td>BATT-</td></tr> <tr><td>2</td><td>BATT-</td></tr> <tr><td>3</td><td>TRD_P</td></tr> <tr><td>4</td><td>TRD_N</td></tr> <tr><td>5</td><td>Not Used</td></tr> <tr><td>6</td><td>RS-232_GND</td></tr> <tr><td>7</td><td>RS-232 TX</td></tr> <tr><td>8</td><td>RS-232 RX</td></tr> <tr><td>9</td><td>BATT+</td></tr> <tr><td>10</td><td>BATT+</td></tr> <tr><td>11</td><td>CAN_L</td></tr> <tr><td>12</td><td>CAN_H</td></tr> </tbody> </table>	PIN#	Description	1	BATT-	2	BATT-	3	TRD_P	4	TRD_N	5	Not Used	6	RS-232_GND	7	RS-232 TX	8	RS-232 RX	9	BATT+	10	BATT+	11	CAN_L	12	CAN_H	
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<p>Ethernet Power Connector 1 Phoenix Contact M12 8-pin connector (A-coded), Female, P/N: 1406117 (Connector J1 on the right-hand side)</p> <table border="1"> <thead> <tr> <th>PIN#</th> <th>Description</th> </tr> </thead> <tbody> <tr><td>1</td><td>BI_DC_P</td></tr> <tr><td>2</td><td>BI_DD_P</td></tr> <tr><td>3</td><td>BI_DD_N</td></tr> <tr><td>4</td><td>BI_DA_N</td></tr> <tr><td>5</td><td>BI_DB_P</td></tr> <tr><td>6</td><td>BI_DA_P</td></tr> <tr><td>7</td><td>BI_DC_N</td></tr> <tr><td>8</td><td>BI_DB_N</td></tr> </tbody> </table>	PIN#	Description	1	BI_DC_P	2	BI_DD_P	3	BI_DD_N	4	BI_DA_N	5	BI_DB_P	6	BI_DA_P	7	BI_DC_N	8	BI_DB_N									
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Mating Connectors	Mating connectors should meet the following standard for M12 Connectors, IEC 61076-2-101:2012. They should be A-coded.
Mating Wire Harnesses	The following part numbers are available from Axiomatic. AX070535: Ethernet Cable 2 m (6.5 ft.), 8-pin M12 A-coded, Ethernet Jack Note: Cable supplier is Phoenix Contact Network cable NBC-M12MR/2,0-94B/R4AC US – 1406112. The M12 connector on the harness assembly is rated for -20 to +85°C and the RJ45 ethernet jack is rated as -20 to +60°C. AX070533: Cable 1.5 m (5 ft.), 12-pin M12 A-coded, Underterminated Leads

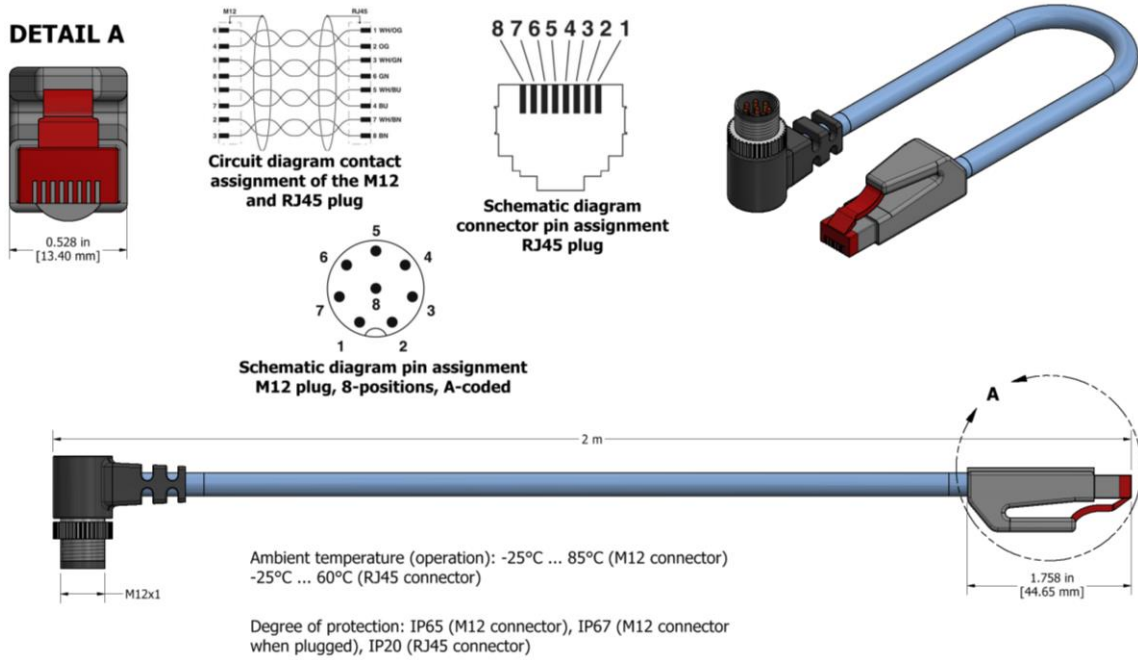


Figure 3.0 AX070535 Mating Cable

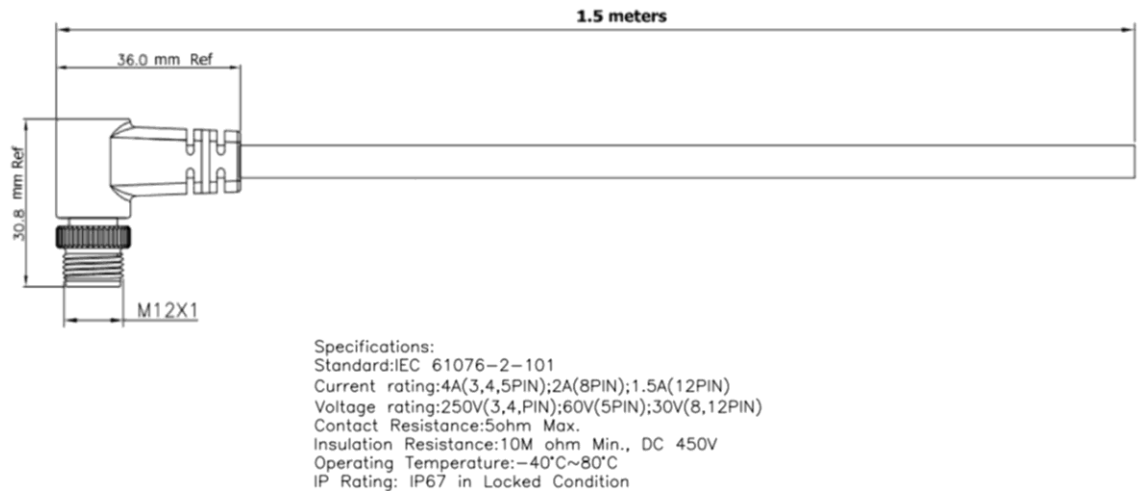


Figure 4.0 AX070533 Mating Cable