Gigabit Ethernet / Gigabit Automotive Ethernet Converter

2 M12 8-Pin Connectors
P/N: AX141550

Features

- 12 Vdc, 24 Vdc input power (nominal) for connection to a battery
- 1 gigabit/standard Ethernet port (100 Mbps or 1000 Mbps)
- 1 gigabit/standard Automotive Ethernet port (100 Mbps or 1000 Mbps)
- Surge, reverse polarity, input overvoltage, and input undervoltage protection
- Master or Slave functionality configuration via RS-232 interface
- Power, Link, and Activity LED indicators
- 2x 8-pin M12 connectors
- Compact
- IP67
- Suitable for high vibration and shock environments

Applications

- Off-highway equipment
- Mining equipment
- Industrial trucks

Ordering Part Number

Gigabit Ethernet / Gigabit Automotive Ethernet Converter: **AX141550**

The Converter with its two accessory cables is also available as a kit. P/N: **AX141550K**

Accessories:
AX070535: Ethernet Cable 2 m (6.5 ft.), 8-pin M12 A-coded, Ethernet Jack
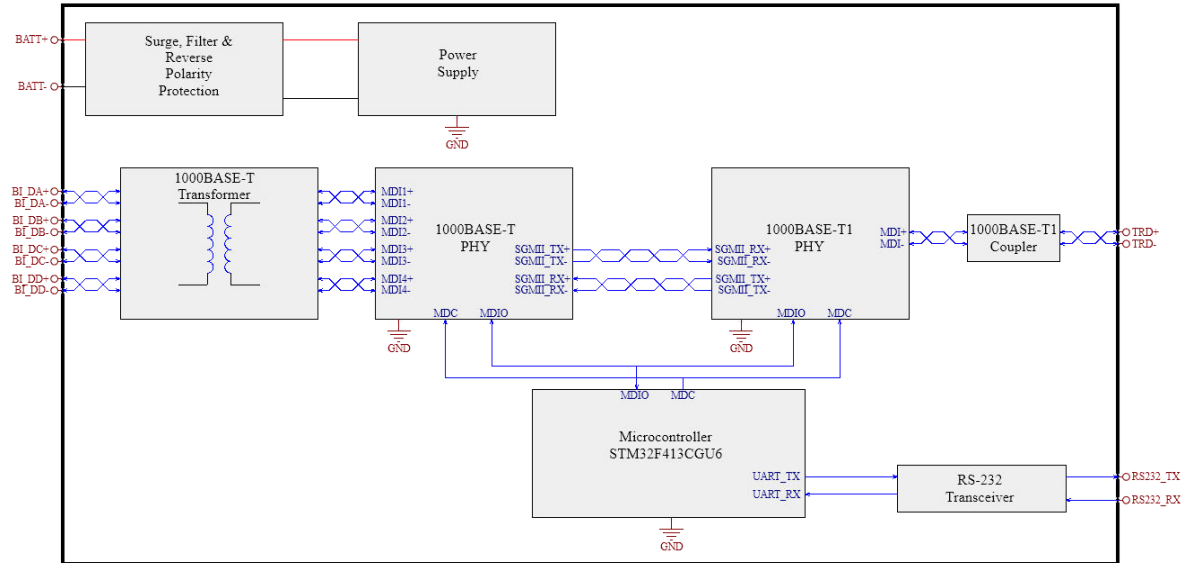**AX070537:** Cable 2 m (6.5 ft.), 8-pin M12 A-coded, Unterminated Leads

Description

The Axiomatic Gigabit Ethernet to Gigabit Automotive Ethernet Converter provides a purely physical, bi-directional conversion between Gigabit Automotive Ethernet (1000BASE-T1) and Gigabit Ethernet (1000BASE-T) via PHY transceivers. No packets are stored or modified in this device. The converter supports a baud rate of 100 Mbit/s and 1000 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.

The unit is 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.

The Institute of Electrical and Electronic Engineers (IEEE) 802.3bp standard (also known as 1000BASE-T1) is a 1000 Mbps Automotive Ethernet standard aimed at increasing data throughput, meeting strong automotive emissions standards, and reducing cabling weight and cost in automotive networking. Automotive Ethernet networks use a 2-wire, twisted pair cable.

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 Power Supply

Input Power Supply	12 Vdc, 24 Vdc nominal (9 Vdc to 36 Vdc power supply range)
Quiescent Current Draw	93 mA @ 12 Vdc; 48 mA @ 24 Vdc
Protections	Surge protection is provided. Reverse polarity protection up to Vps is provided. Overvoltage protection provided. Shutdown at 39 V. Undervoltage protection provided. Shutdown at 5.4 V.

Ethernet Port

Port Type	1 port (100 Mbps or 1000 Mbps) Auto-Negotiation Automatic Polarity Correction
MDIX	Auto-MDI/MDIX (crossover)
PHY	Marvell 88EA1512 (100BASE-TX, 1000BASE-T)
Protocol	Ethernet IEEE 802.3
Protection	ESD protection for signal lines

Automotive Ethernet

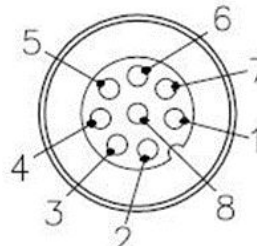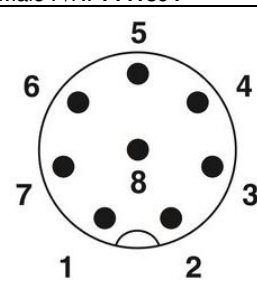|	
Port Type	1 port (100 Mbps or 1000 Mbps) Automatic Polarity Correction for 1000 Mbps mode (Polarity correction is not available for 100 Mbps mode) Default configuration: Slave (Master mode is configurable via RS-232 interface)
PHY	Marvell 88Q2112 (100BASE-T1 / 1000BASE-T1)
Protection	ESD protection for signal lines
Protocol	Automotive Ethernet IEEE 802.3bw for 100BASE-T1 (previously known as BroadR-Reach) Automotive Ethernet IEEE 802.3bp for 1000BASE-T1

Interfaces

RS-232	1x 3-wire RS-232 port Baud rate: 115200 bit/s User interface for reflashing ESD and EFT protection for signal lines
User Interface	Any terminal emulator that supports serial communication.

General Specifications

Functionality	Can be configured to acts as a master or a slave
Microcontroller	STM32F413CGU6
LEDs	3 Green LEDs

LED	ON	BLINK	OFF
Power	Power On		Power Off or Overvoltage/ Undervoltage Condition
Link	Ethernet Link Up	Ethernet Activity	Ethernet Link Down
Activity	Automotive Ethernet Link Up	Automotive Ethernet Activity	Automotive Ethernet Link Down

Compliance	CE / UKCA marking ISO 13766-1:2018 RoHS
Vibration	MIL-STD-202H, method 204D, test condition C 10g peak (Sine) MIL-STD-202H, method 214A, test condition I/B 7.56 Grms (Random)
Shock	MIL-STD-202H, method 213B, test condition A 50g peak
Operating Conditions	-40°C to 80°C (-40°F to 176°F) Please see temperature ratings of cables under Mating Wire Harnesses.
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Protection	IP67
Weight	0.15 lb. (0.068 kg)
Installation	The typical maximum wire harness length for Automotive Ethernet cabling is 15 m.
Enclosure and Dimensions	See dimensional drawing Figure 1.0. Nylon 6/6, 30% glass fill Encapsulation UL 94V-0 Ultrasonically welded

Electrical Connections	**Ethernet Connector** 1 Phoenix Contact M12 8-pin connector (A-coded), Female, P/N: **1441817**

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

Power / **Automotive Ethernet** / **RS-232 Connector**
1 Phoenix Contact M12 8-pin connector (A-coded), Male P/N: **1441804**

Pin	Description
1	Battery -
2	Battery +
3	TRD_P
4	TRD_N
5	RS-232 Ground
6	RS-232 RX
7	RS-232 TX
8	Ground

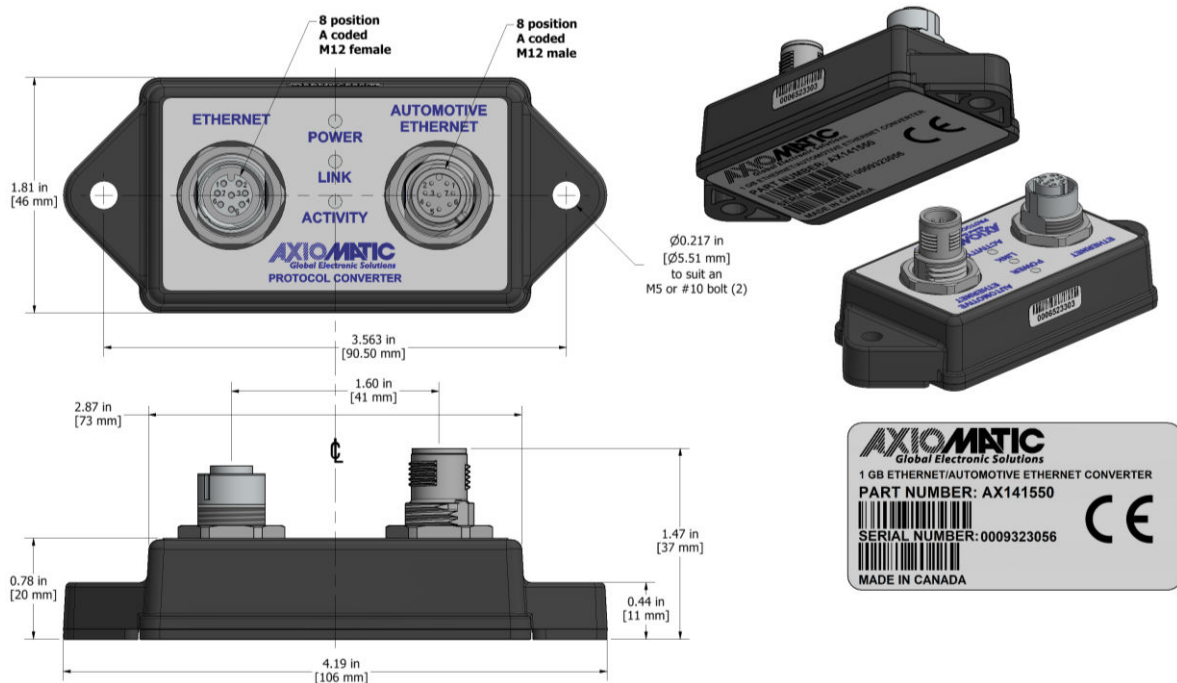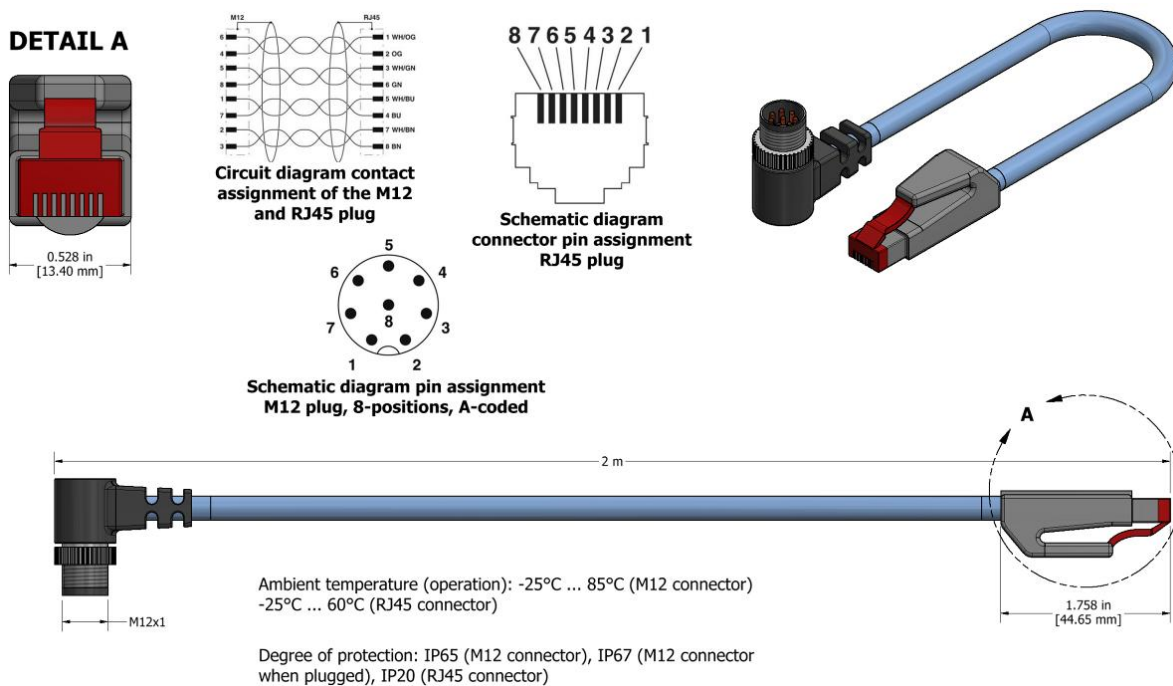| Mating Connectors	Mating connectors should meet the following standard for M12 Connectors, IEC 61076-2-101:2012. They should be A-coded.
Mating Wire Harnesses	The following part numbers are available from Axiomatic. **AX070535:** Ethernet Cable 2 m (6.5 ft.), 8-pin M12 A-coded, Ethernet Jack Note: The M12 connector on the harness assembly is rated for -20°C to 85°C and the RJ45 ethernet jack is rated as -20°C to 60°C. Cable supplier is Phoenix Contact Network cable NBC-M12MR/2,0-94B/R4AC US – 1406112. **AX070537:** Cable 2 m (6.5 ft.), 8-pin M12 A-coded, Unterminated Leads It is rated for temperatures -20°C to +65°C.

Figure 1.0. Dimensional Drawing

Figure 2.0 AX070535 Mating Cable

500 mm

1500 mm

B

C
C
A

sealed to cable
with heat shrink

Y splitter heat shrink

field wireable M12
female A coded

pin 1 POWER - (white/brown)
pin 2 POWER + (brown)
pin 3 TRD_P (blue)
pin 4 TRD_N (white/blue)
pin 5 RS232 GND (green)
pin 6 RS232 RX (white/orange)
pin 7 RS232 TX (orange)
pin 8 NC

jacket or wire wrap

continuous shield
connected to shell

shielded twisted pair

shielded automotive Ethernet
pin 3 TRD_P (blue)
pin 4 TRD_N (white/blue)

DETAIL B
M12 A coded
female connector

8 2 1
3
7 4 5
6

shielded
automotive
Ethernet

SECTION C-C

jacket or wire wrap

pin 2 POWER + (brown)
pin 1 POWER - (white/brown)

pin 5 RS232 GND (green)
pin 6 RS232 RX (white/orange)
pin 7 RS232 TX (orange)
pin 8 NC

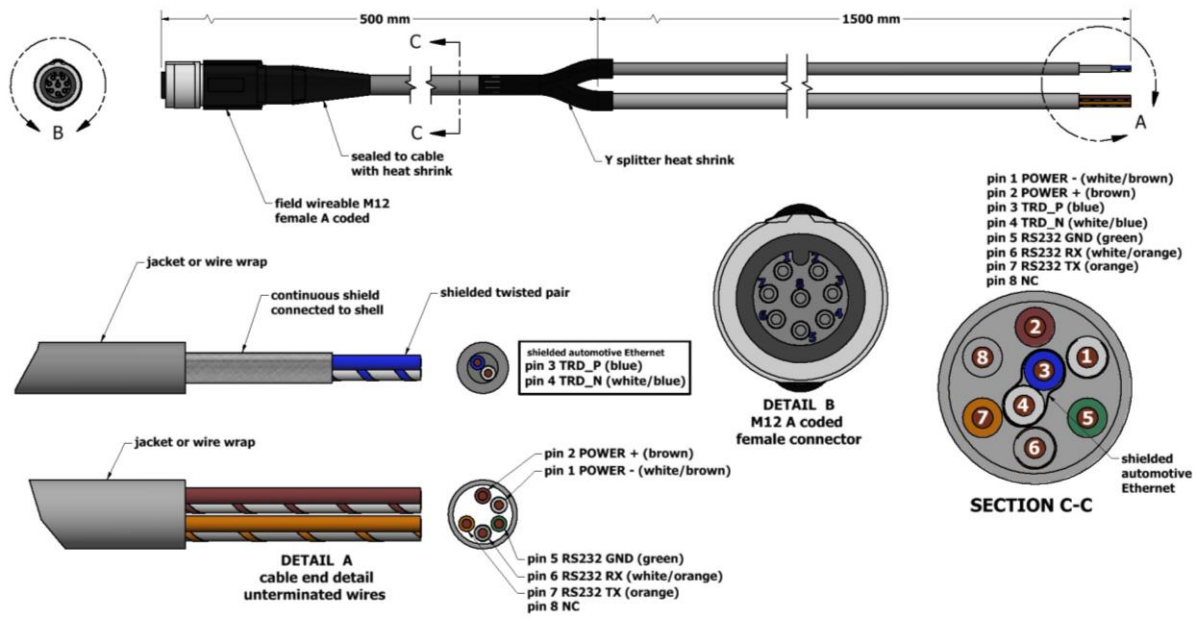**DETAIL A**
cable end detail
unterminated wires

Figure 3.0 AX07537 Mating Cable

Form: TDAX141550-03/13/2025