

**TECHNICAL DATASHEET #TDAX142100**  
**Protocol Converter**  
**Ethernet / RS-422 / 2 RS-232 / SAE J1939 CAN**

**P/N: AX142100**

## Features

- Fast and bidirectional data exchange between an Ethernet, a RS-422 bus, two RS-232 buses and a CAN network (SAE J1939) (CANopen® model available)
- ASCII to Programmable Logic Controller (PLC) gateway
- 1 Isolated CAN port (CAN 2.0B)
- 1 RS-422 port (can be used as RS-485)
- 2 RS-232 serial ports
- 1 Ethernet interface (TCP communication at user configurable port)
- Power, Link and Speed LED indicators
- Operational from 9 to 36 Vdc (12 Vdc, 24 Vdc nominal)
- Fully sealed enclosure with a rugged IP67 protection rating
- Suitable for high vibration environments
- One 8-pin M12 connector; 1 12-pin M12 connector
- Compact size
- User configurable using a web browser



## Applications

Communications interface between legacy ASCII systems and PLC's

### Ordering Part Numbers:

Protocol Converter, Ethernet / RS-422 / 2 RS-232 / SAE J1939 CAN - P/N: **AX142100**

KIT (Protocol Converter, Ethernet / RS-422 / 2 RS-232 / SAE J1939 CAN and mating cables AX070531 and AX070533) - P/N: **AX142100K**

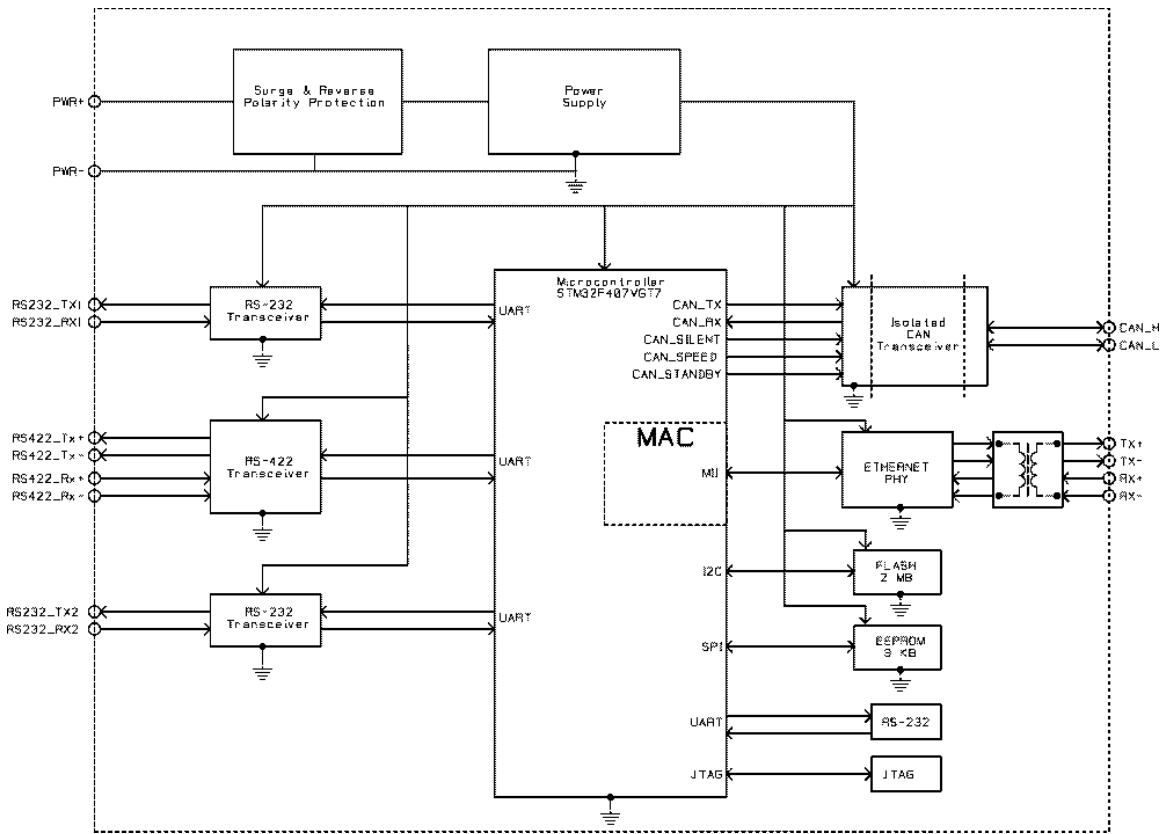
Protocol Converter, **Ethernet / RS-422 / 2 RS-232 / CANopen® CAN** - P/N: **AX142101**

Mating Cables:

**AX070531:** Ethernet and Power Cable 1.7 m (5.5 ft.), 8-pin M12 A-coded, Unterminated Leads, Ethernet Jack

**AX070533:** CAN, RS-232, RS-422 Cable 1.5 m (5 ft.), 12-pin M12, Unterminated Leads

## Block Diagram



## Technical Specifications

Specifications are typical at nominal input voltage and 25 degrees C unless otherwise specified.

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/>.

### Power

|                              |                                    |
|------------------------------|------------------------------------|
| Power Supply Input - Nominal | 12 V or 24 Vdc nominal; 9...36 Vdc |
| Under-voltage Protection     | Hardware shuts down at 6Vdc.       |
| Surge Protection             | 95 Vdc                             |
| Over-voltage Protection      | Hardware shuts down at 45Vdc.      |
| Reverse Polarity Protection  | Provided up to -90V                |

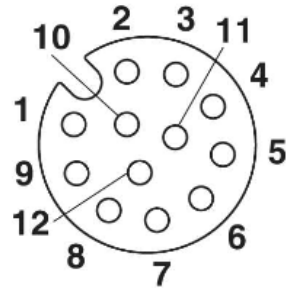
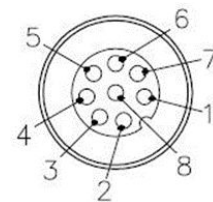
### Functionality

|                     |   |
|---------------------|---|
| Conversion Platform | <p>The Protocol Converter comes pre-programmed with standard protocol conversion logic for bidirectional data exchange between Ethernet (proprietary TCP communications), an RS-422 bus, two RS-232 buses and a CAN network (SAE J1939).</p> <p>Data is forwarded “as-is” between the different serial ports. Also, CAN / Ethernet data is forwarded directly to serial interfaces with the configuration allowing the user to specify the CAN message ID (or TCP port) to listen for data to be forwarded.</p> |
|---------------------|---|

|                                 |   |                                 |   |                              |       |                              |       |                    |              |
|---------------------------------|---|---------------------------------|---|------------------------------|-------|------------------------------|-------|--------------------|--------------|
| Ethernet                        | Single 10/100 Mbit Ethernet compliant port<br>10BASE-T, 100BASE-Tx (auto-negotiation and full-duplex supported)<br>Auto-MDIX  |                                 |   |                              |       |                              |       |                    |              |
| RS-422                          | Single RS-422 port<br>Baud rate: up to 10.5 MBit/s<br>Note: RS-422 connections can be used as RS-485. See pinout.   |                                 |   |                              |       |                              |       |                    |              |
| RS-232                          | Two RS-232 ports for serial communications<br>Three-wire<br>Baud rate: up to 400 kBit/s   |                                 |   |                              |       |                              |       |                    |              |
| ASCII Features                  | <table border="1"> <tr> <td>Maximum Number of ASCII devices</td><td>2</td></tr> <tr> <td>Serial Communications Port 0</td><td>RS422</td></tr> <tr> <td>Serial Communications Port 1</td><td>RS232</td></tr> <tr> <td>Message Queue Size</td><td>Configurable</td></tr> </table> | Maximum Number of ASCII devices | 2 | Serial Communications Port 0 | RS422 | Serial Communications Port 1 | RS232 | Message Queue Size | Configurable |
| Maximum Number of ASCII devices | 2   |                                 |   |                              |       |                              |       |                    |              |
| Serial Communications Port 0    | RS422   |                                 |   |                              |       |                              |       |                    |              |
| Serial Communications Port 1    | RS232   |                                 |   |                              |       |                              |       |                    |              |
| Message Queue Size              | Configurable  |                                 |   |                              |       |                              |       |                    |              |
| CAN                             | Single SAE J1939 port<br>Isolated<br>Baud rate: 250 kBit/s (default)<br>(CANopen® model available)  |                                 |   |                              |       |                              |       |                    |              |

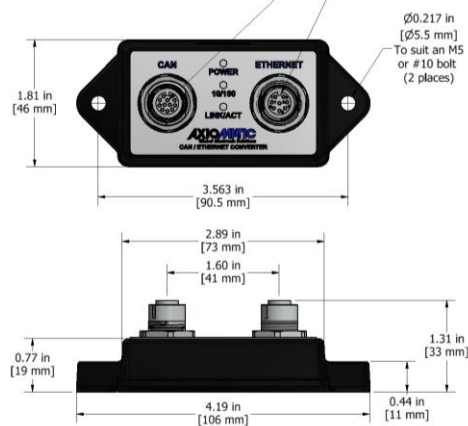
## General Specifications

|                          |   |
|--------------------------|---|
| Microcontroller          | STM32F407VGT7<br>32-bit, 1Mbyte Flash Program Memory  |
| Quiescent Current Draw   | 70 mA @12 V; 40 mA @24 V Typical  |
| Isolation                | CAN isolation: 330 Vrms   |
| LED Indicators           | <p><u>POWER LED</u><br/>GREEN= Power ON<br/>RED = Fault condition<br/>GREEN/RED = Power OFF</p> <p><u>2 GREEN for Ethernet LEDs</u><br/>LINK/ACT: ON means connection (LINK)<br/>Flashing means activity (ACT)<br/>OFF means Ethernet connection is down<br/>Transmission Speed: 100 Mbit/s = ON<br/>10 Mbit/s = OFF</p>  |
| Web Interface            | <p>Available<br/>Refer to the User Manual.<br/>The functionality of the web interface includes but is not limited to the following.</p> <ul style="list-style-type: none"> <li>Specify CAN message filters and CAN message IDs to be received</li> <li>Link RS-232 or RS-422 to CAN bus and Ethernet</li> <li>Define CAN node ID, and baud rate</li> <li>Define Ethernet parameters (IP address, netmask)</li> <li>Configure message queues</li> </ul>  |
| User Interface           | <p>Axiomatic Electronic Assistant KIT P/Ns: AX070502 or AX070506K<br/>The Axiomatic Electronic Assistant for <i>Windows</i> operating systems comes with a royalty-free license for use on multiple computers. It requires an Axiomatic USB-CAN converter to link the device's CAN port to a <i>Windows</i>-based PC.<br/>The functionality of the Axiomatic Electronic Assistant includes:</p> <ul style="list-style-type: none"> <li>IP address configuration</li> <li>Firmware Reflashing</li> </ul> |
| Operating Conditions     | -40 to 70°C (-40 to 158°F)  |
| Weight                   | 0.15 lb. (0.068 kg) without mating cables   |
| Enclosure and Dimensions | Nylon 6/6, 30% glass fill<br>UL 94V-0<br>Ultrasonically welded<br>Refer to dimensional drawing.   |
| Protection Rating        | IP67; Unit is encapsulated within the housing.  |
| Vibration                | Random Vibration: Z-axis tracked vehicle profile (5 hr/axis in all 3 axes)<br>Sinusoidal Component: 8.9 G Sine sweep, 2.5 hr/axis in all 3 axes   |
| Shock                    | 50 g, 5 impacts per test, 6-20 ms impact duration   |
| Electrical Connections   | <p><b>CAN / RS-232 / RS-422 Connector</b><br/>1 Phoenix Contact M12 12-pin connector (A-coded), Female P/N: 1441833</p> <p>Note: To use RS-422 as RS-485, connect the Tx+ and Rx+ pin to D+ on the RS-485 connector. Also connect the Tx- and Rx- to pin D-.</p>  |

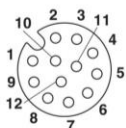
|                   | <table><tr><th>PIN#</th><th>Description</th></tr><tr><td>1</td><td>RS-422 RX+</td></tr><tr><td>2</td><td>RS-422 TX+</td></tr><tr><td>3</td><td>RS-422 RX-</td></tr><tr><td>4</td><td>RS-232 TX 2</td></tr><tr><td>5</td><td>RS-232 RX 2</td></tr><tr><td>6</td><td>CAN L</td></tr><tr><td>7</td><td>CAN H</td></tr><tr><td>8</td><td>RS-232 TX 1</td></tr><tr><td>9</td><td>RS-232 RX 1</td></tr><tr><td>10</td><td>RS-422 TX-</td></tr><tr><td>11</td><td>GND</td></tr><tr><td>12</td><td>GND</td></tr></table>  | PIN# | Description | 1 | RS-422 RX+ | 2 | RS-422 TX+ | 3 | RS-422 RX- | 4 | RS-232 TX 2  | 5 | RS-232 RX 2  | 6 | CAN L        | 7 | CAN H   | 8 | RS-232 TX 1  | 9 | RS-232 RX 1 | 10 | RS-422 TX- | 11 | GND | 12 | GND |
|-------------------|--|------|-------------|---|------------|---|------------|---|------------|---|--------------|---|--------------|---|--------------|---|---------|---|--------------|---|-------------|----|------------|----|-----|----|-----|
| PIN#              | Description  |      |             |   |            |   |            |   |            |   |              |   |              |   |              |   |         |   |              |   |             |    |            |    |     |    |     |
| 1                 | RS-422 RX+   |      |             |   |            |   |            |   |            |   |              |   |              |   |              |   |         |   |              |   |             |    |            |    |     |    |     |
| 2                 | RS-422 TX+   |      |             |   |            |   |            |   |            |   |              |   |              |   |              |   |         |   |              |   |             |    |            |    |     |    |     |
| 3                 | RS-422 RX-   |      |             |   |            |   |            |   |            |   |              |   |              |   |              |   |         |   |              |   |             |    |            |    |     |    |     |
| 4                 | RS-232 TX 2  |      |             |   |            |   |            |   |            |   |              |   |              |   |              |   |         |   |              |   |             |    |            |    |     |    |     |
| 5                 | RS-232 RX 2  |      |             |   |            |   |            |   |            |   |              |   |              |   |              |   |         |   |              |   |             |    |            |    |     |    |     |
| 6                 | CAN L  |      |             |   |            |   |            |   |            |   |              |   |              |   |              |   |         |   |              |   |             |    |            |    |     |    |     |
| 7                 | CAN H  |      |             |   |            |   |            |   |            |   |              |   |              |   |              |   |         |   |              |   |             |    |            |    |     |    |     |
| 8                 | RS-232 TX 1  |      |             |   |            |   |            |   |            |   |              |   |              |   |              |   |         |   |              |   |             |    |            |    |     |    |     |
| 9                 | RS-232 RX 1  |      |             |   |            |   |            |   |            |   |              |   |              |   |              |   |         |   |              |   |             |    |            |    |     |    |     |
| 10                | RS-422 TX-   |      |             |   |            |   |            |   |            |   |              |   |              |   |              |   |         |   |              |   |             |    |            |    |     |    |     |
| 11                | GND  |      |             |   |            |   |            |   |            |   |              |   |              |   |              |   |         |   |              |   |             |    |            |    |     |    |     |
| 12                | GND  |      |             |   |            |   |            |   |            |   |              |   |              |   |              |   |         |   |              |   |             |    |            |    |     |    |     |
|                   | <p><b>Ethernet / Power Connector</b></p> <p>1 Phoenix Contact M12 8-pin connector (A-coded), Female, P/N: 1441817</p> <table><tr><th>PIN#</th><th>Description</th></tr><tr><td>1</td><td>Power +</td></tr><tr><td>2</td><td>Power -</td></tr><tr><td>3</td><td>Power -</td></tr><tr><td>4</td><td>Ethernet TX-</td></tr><tr><td>5</td><td>Ethernet RX+</td></tr><tr><td>6</td><td>Ethernet TX+</td></tr><tr><td>7</td><td>Power +</td></tr><tr><td>8</td><td>Ethernet RX-</td></tr></table>                       | PIN# | Description | 1 | Power +    | 2 | Power -    | 3 | Power -    | 4 | Ethernet TX- | 5 | Ethernet RX+ | 6 | Ethernet TX+ | 7 | Power + | 8 | Ethernet RX- |   |             |    |            |    |     |    |     |
| PIN#              | Description  |      |             |   |            |   |            |   |            |   |              |   |              |   |              |   |         |   |              |   |             |    |            |    |     |    |     |
| 1                 | Power +  |      |             |   |            |   |            |   |            |   |              |   |              |   |              |   |         |   |              |   |             |    |            |    |     |    |     |
| 2                 | Power -  |      |             |   |            |   |            |   |            |   |              |   |              |   |              |   |         |   |              |   |             |    |            |    |     |    |     |
| 3                 | Power -  |      |             |   |            |   |            |   |            |   |              |   |              |   |              |   |         |   |              |   |             |    |            |    |     |    |     |
| 4                 | Ethernet TX-   |      |             |   |            |   |            |   |            |   |              |   |              |   |              |   |         |   |              |   |             |    |            |    |     |    |     |
| 5                 | Ethernet RX+   |      |             |   |            |   |            |   |            |   |              |   |              |   |              |   |         |   |              |   |             |    |            |    |     |    |     |
| 6                 | Ethernet TX+   |      |             |   |            |   |            |   |            |   |              |   |              |   |              |   |         |   |              |   |             |    |            |    |     |    |     |
| 7                 | Power +  |      |             |   |            |   |            |   |            |   |              |   |              |   |              |   |         |   |              |   |             |    |            |    |     |    |     |
| 8                 | Ethernet RX-   |      |             |   |            |   |            |   |            |   |              |   |              |   |              |   |         |   |              |   |             |    |            |    |     |    |     |
| Mating Connectors | <p>Not supplied</p> <p>Mating connectors should meet the following standard for M12 Connectors, IEC 61076-2-101:2012. They should be A-coded.</p>  |      |             |   |            |   |            |   |            |   |              |   |              |   |              |   |         |   |              |   |             |    |            |    |     |    |     |
| Mating Cables     | <p>Refer to the drawings for AX070533 and AX070531. They are located on <a href="http://www.axiomatix.com">www.axiomatix.com</a> under the log-in tab in the user manual section.</p> <p><b>AX070531:</b> Ethernet and Power Cable 1.7 m (5.5 ft.), 8-pin M12 A-coded, Unterminated Leads, Ethernet Jack</p> <p><b>AX070533:</b> CAN, RS-232, RS-422 Cable 1.5 m (5 ft.), 12-pin M12, Unterminated Leads</p>   |      |             |   |            |   |            |   |            |   |              |   |              |   |              |   |         |   |              |   |             |    |            |    |     |    |     |
| Installation      | <p>Suits two M5 or #10 mounting bolts.</p>   |      |             |   |            |   |            |   |            |   |              |   |              |   |              |   |         |   |              |   |             |    |            |    |     |    |     |

M12 "A" coded 12 pin female receptacle  
**CAN Connector / RS422 / 2 RS232**

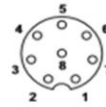
M12 "A" coded 8 pin female receptacle  
**ETHERNET Connector / Power**



| PIN | FUNCTION  | PIN | FUNCTION  |
|-----|-----------|-----|-----------|
| 1   | RS422_RX+ | 7   | CAN_H     |
| 2   | RS422_TX+ | 8   | RS232_TX1 |
| 3   | RS422_RX- | 9   | RS232_RX1 |
| 4   | RS232_TX2 | 10  | RS422_TX- |
| 5   | RS232_RX2 | 11  | GND       |
| 6   | CAN_L     | 12  | GND       |



| PIN | FUNCTION | PIN | FUNCTION |
|-----|----------|-----|----------|
| 1   | PWR+     | 5   | ETH_RX+  |
| 2   | PWR-     | 6   | ETH_TX+  |
| 3   | PWR-     | 7   | PWR+     |
| 4   | ETH_TX-  | 8   | ETH_RX-  |



**Unit Label**

Figure 1.0 – Dimensional Drawing

Note: CANopen® is a registered community trademark of CAN in Automation e. V.

Form: TDAX142100-11/23/23