


6 Analog Input CAN Controller

CAN (SAE J1939 or CANopen®)

with Electronic Assistant® 

P/N: AX030400

Features:

- 6 analog inputs (0-5V, 0-10V, 0-20mA, 4-20mA, Resistance, PWM, Digital, Pulse, Counter) are user selectable
- 7 reference voltages
- 12V/24VDC input power (nominal) with rugged surge protection
- 1 CAN (SAE J1939)
- CANopen® module available on request
- Rugged IP67 packaging and connectors
- **Electronic Assistant®**  runs on a Windows operating system for user configuration. An Axiomatic USB-CAN converter links the PC to the CAN bus.



Applications:

- Engine controls for power generation, co-generation, stationary power
- Engine controls for commercial vehicles, off-highway equipment, etc.

Ordering Part Numbers:

SAE J1939 version

Controller: **AX030400**

Accessories:

PL-DTM06-12SA-12SB Mating Plug Kit

(The KIT is comprised of: DTM06-12S, DTM06-12SB, 2 W12S and 24 contacts. The Axiomatic stock # is FG-IOCTRL-19.)

AX070502 Configuration KIT includes the following.

USB-CAN Converter P/N: AX070501

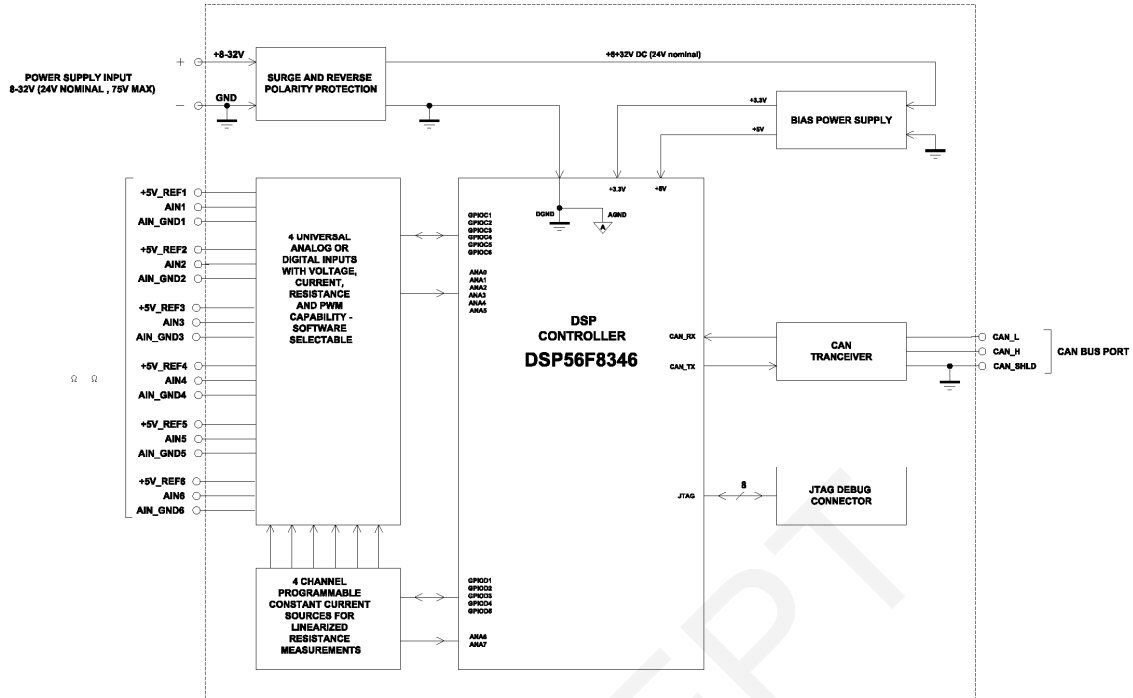
1 ft. (0.3 m) USB Cable P/N: CBL-USB-AB-MM-1.5

12 in. (30 cm) CAN Cable with female DB-9 P/N: CAB-AX070501

AX070502IN CD P/N: CD-AX070502, includes: **Electronic Assistant®** software; EA & USB-CAN User Manual UMAX07050X; USB-CAN drivers & documentation; CAN Assistant (Scope and Visual) software & documentation; and the SDK Software Development Kit.

NOTE: To order this kit, you need only to specify P/N: AX070502.

BLOCK DIAGRAM



Technical Specifications: Input Specifications

Power Supply Input - Nominal	12, 24VDC nominal (8...32 VDC power supply range) 95V peak
Protection	Surge and reverse polarity protection are provided.
Digital Inputs	Up to 6 analog inputs are selectable by the user. Refer to Table 1.0. With the CAN model, AX030400, all input channels are completely independent of each other as well as can simultaneously send a message to the J1939 bus.
Input Protection	Full protection to all other physical pins (any other input, output or power terminal).
Ground Connection	6 analog GND connections are provided.

Table 1.0 - Inputs	
Analog Inputs	<p>Up to 6 analog inputs are available. They can be configured for any one of the following options.</p> <ul style="list-style-type: none"> 0-5V 0-10V 0-20 mA 4-20 mA Potentiometer (recommended value 0.1 to 10 KOhms) Resistance 20-10000 Ohms <p>The analog inputs can also be configured for any one of the following options.</p> <ul style="list-style-type: none"> Digital Input (Active High) Disable input PWM signal input (0-10,000 Hz, 0-100% D.C.) Pulse Input (Hz or RPM) (0-10,000 Hz) Counter Input <p>Threshold 2.5V (Other values are available on request.) Hysteresis 1V</p>
Input Accuracy	Contact Axiomatic.
Input Resolution	Contact Axiomatic.

Output Specifications

Output	CAN Messages SAE J1939 {CANopen (model AX030401)}
Reference Voltages	7 +5V reference voltages, 20 mA NB. When connecting multiple pots, do NOT draw more current than 20 mA in total.

General Specifications

Microprocessor	DSP56F8346
Control Logic	Standard embedded software is provided. (Application-specific control logic is available on request.)
Diagnostics	Each input channel can be configured to send diagnostic messages to the network if the input goes out of range, as described below. In addition to the input channels, three other types of faults can be reported to the network using diagnostic messaging. They are Over Temperature (of the controller processor), Over Voltage and Under Voltage (of the power supply voltage).
Quiescent Current Draw	Contact Axiomatic.
Response Time	Contact Axiomatic.
Operating Conditions	-40 to 85 °C (-40 to 185 °F)
Protection	IP67, PCB is conformally coated and protected by the housing. Plugs carry an IP69 rating.
Communications	1 CAN port (SAE J1939) (Model AX030401 is CANopen)
User Interface (PC-based)	Electronic Assistant® for <i>Windows</i> operating systems It comes with a royalty-free license for use. The Electronic Assistant® requires an USB-CAN converter to link the device's CAN port to a <i>Windows</i> -based PC for initial configuration. An Axiomatic USB-CAN Converter AX070501 is available. Order the EA and USB-CAN as a kit (P/N AX070502), which includes all interconnecting cables. <i>Refer to Table 2.0 for details.</i>

Set up of Controller on a CAN Network:

Set up of SAE J1939 Controller on a CAN Network:

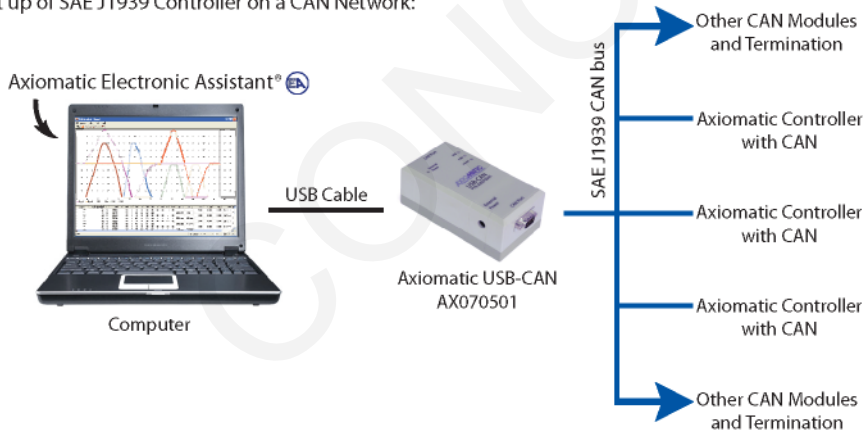



Table 2.0 - Axiomatic Electronic Assistant and AX070501 USB-CAN Converter



AX070502, Configuration KIT

AX070502, Configuration KIT includes the following.


USB-CAN Converter P/N: AX070501

1 ft. (0.3 m) USB Cable P/N: CBL-USB-AB-MM-1.5

12 in. (30 cm) CAN Cable with female DB-9 P/N: CAB-AX070501

AX070502IN CD P/N: CD-AX070502, includes: Electronic Assistant® software; EA & USB-CAN User Manual UMAX07050X; USB-CAN drivers & documentation; CAN Assistant (Scope and Visual) software & documentation; and the Software Development Kit.

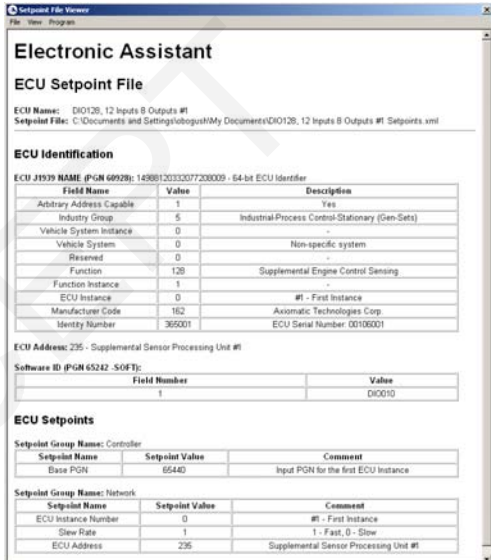
NOTE: To order this kit, you need only to specify P/N: AX070502.

Electronic Assistant® 

The Electronic Assistant (EA) runs on any modern PC with the Microsoft Windows® 2000 operating system or higher. It comes with a royalty-free license for use.

System Requirements:
 Operating System: *Windows* 2000 or higher including 64-bit editions
 Port: USB 1.1 or 2.0 full speed
 Display: VGA (XGA or better with 1024 x 768 recommended)
 Setup and Configuration:
 Refer to the User Manual UMAX07050X.

To order the EA software at the time of initial purchase, order the KIT AX070502 (see above) which includes the USB-CAN converter. For additional EA and USB-CAN software ONLY CD's, use ordering P/N: CD-AX070502.



Sample setpoint file

CAN	<p>1 CAN port (SAE J1939)</p> <p>The software was designed to provide flexibility and provides the following.</p> <ul style="list-style-type: none"> • Configurable ECU Instance in the NAME (for multiple ECU's on the network) • Configurable Input Parameters • Configurable PGN and SPN (Data Parameters) • Configurable Diagnostic Messaging Parameters, as required • Diagnostic Log, maintained in non-volatile memory <p><i>Note: Configurable parameters are also called setpoints.</i></p> <p>The Axiomatic AX030400 is compliant with Bosch CAN protocol specification, Rev.2.0, Part B, and the following J1939 standards.</p> <table border="1" data-bbox="581 426 1365 1388"> <thead> <tr> <th colspan="2" data-bbox="581 426 1365 453"><i>Table 3: J1939 Compliance</i></th> </tr> <tr> <th data-bbox="581 453 808 499">OSI Network Model Layer</th> <th data-bbox="808 453 1365 499">J1939 Standard</th> </tr> </thead> <tbody> <tr> <td data-bbox="581 499 808 569">Physical</td> <td data-bbox="808 499 1365 569">J1939/11 – Physical Layer, 250K bit/s, Twisted Shielded Pair. J1939/15 - Reduced Physical Layer, 250K bits/sec, Un-Shielded Twisted Pair (UTP).</td> </tr> <tr> <td data-bbox="581 569 808 730">Data Link</td> <td data-bbox="808 569 1365 730">J1939/21 – Data Link Layer The controller supports Transport Protocol for Diagnostic DM1 and DM2 messages (PGN 65226 and 65227). It supports responses on PGN Requests (PGN 59904) and acknowledgements (PGN 59392). It also supports Proprietary B messaging (PGN 65280 to 65535), and uses a proprietary scheme described in the User Manual.</td> </tr> <tr> <td data-bbox="581 730 808 898">Network Layer</td> <td data-bbox="808 730 1365 898">J1939/81 – Network Management J1939, Appendix B – Address and Identity Assignments Arbitrary Address Capable ECU - It can dynamically change its network address in real time. The controller supports: Address Claimed Messages (PGN 60928), Requests for Address Claimed Messages (PGN 59904) and Commanded Address Messages (PGN 65240).</td> </tr> <tr> <td data-bbox="581 898 808 1388">Application Layer</td> <td data-bbox="808 898 1365 1388">J1939/71 – Vehicle Application Layer None of the application layer PGN's are supported as part of the default configurations. However, the controller could be configured such that any of the input messages to be sent will use a PGN from this section. The data size, index, resolution and offset can all be configured for the appropriate SPN associated with the PGN. <i>It is the user's responsibility to configure the controller such that it will not violate the J1939 standard.</i> J1939/73 – Application Layer – Diagnostics The controller can be configured to send "Active Diagnostic Trouble Code" DM1 messages (PGN 65226) for any input channel. Warning and Protect diagnostics will automatically become previously active when cleared. "Previously Active Diagnostic Trouble Codes" DM2 messages (PGN 65227) are available on request. Shutdown diagnostics will be cleared upon receiving a "Diagnostic Data Clear/Reset for Active DTC's" DM11 message (PGN 65235). Occurrence counts in the diagnostic log will be cleared upon receiving a "Diagnostic Data Clear/Reset for Previously Active DTC's" DM3 message (PGN 65228).</td> </tr> </tbody> </table>	<i>Table 3: J1939 Compliance</i>		OSI Network Model Layer	J1939 Standard	Physical	J1939/11 – Physical Layer, 250K bit/s, Twisted Shielded Pair. J1939/15 - Reduced Physical Layer, 250K bits/sec, Un-Shielded Twisted Pair (UTP).	Data Link	J1939/21 – Data Link Layer The controller supports Transport Protocol for Diagnostic DM1 and DM2 messages (PGN 65226 and 65227). It supports responses on PGN Requests (PGN 59904) and acknowledgements (PGN 59392). 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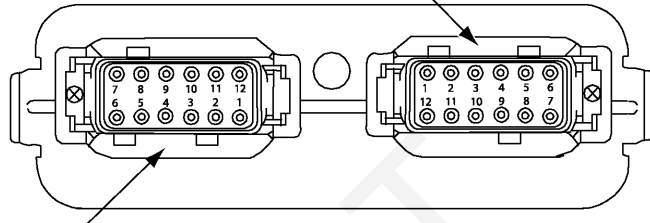
Electrical Connections

Deutsch DTM series 24 pin receptacle (DTM13-12PA-12PB-R008)
 Mating plug: Deutsch DTM06-12SA and DTM06-12SB
 with 2 wedgelocks (WM12S) and 24 contacts (0462-201-20141).
 20 AWG wire is recommended for use with contacts 0462-201-20141.

Use dielectric grease on the pins when installing the controller.

Wiring to these mating plugs must be in accordance with all applicable local codes. Suitable field wiring for the rated voltage and current must be used. The rating of the connecting cables must be at least 70°C. Use field wiring suitable for both minimum and maximum ambient temperature.

Key Arrangement B (black)



Key Arrangement A (grey)

FRONT VIEW 24 PIN RECEPTACLE

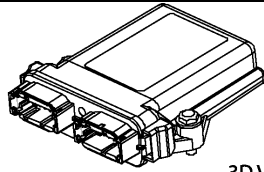
Grey Connector		Black Connector	
1	+5V Reference	1	+5V Reference
2	CAN_Shield	2	Analog Input 3
3	CAN_H	3	Analog Input 3_GND
4	CAN_L	4	+5V Reference
5	BATT-	5	Analog Input 4
6	BATT+	6	Analog Input 4_GND
7	+5V Reference	7	+5V Reference
8	Analog Input 1	8	Analog Input 5
9	Analog Input 1_GND	9	Analog Input 5_GND
10	+5V Reference	10	+5V Reference
11	Analog Input 2	11	Analog Input 6
12	Analog Input 2_GND	12	Analog Input 6_GND

Packaging and Dimensions

High Temperature Nylon housing - Deutsch IPD PCB Enclosure (EEC-325X4B)
 4.62 x 5.24 x 1.43 inches 117.42 x 133.09 x 36.36 mm
 (W x L x H excluding mating plugs)

Weight

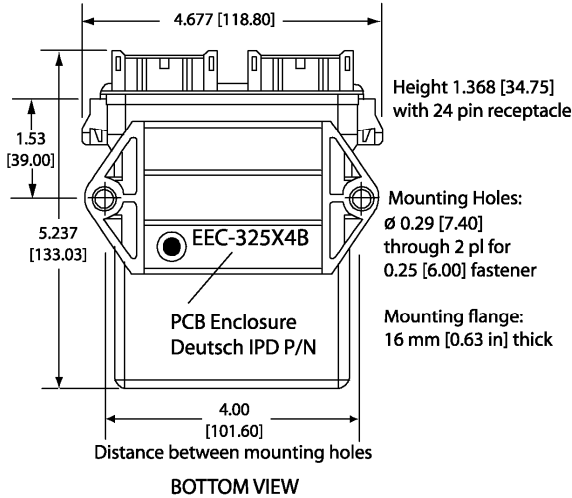
Contact Axiomatic.



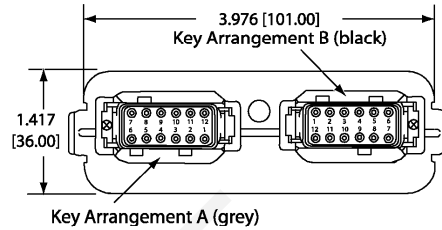
HOUSING DIMENSIONS

Housing Material: High Temperature Nylon (Black)

3D VIEW
Housing with 24 Pin Receptacle



FRONT VIEW 24-PIN RECEPTACLE (NOT TO SCALE)



Mating Plug Assemblies for 24-pin receptacle:
Deutsch IPD P/N: DTM06-12SA and DTM06-12SB
with wedgelocks WM12S and contacts
(Contact factory for contact specification.)

Dimensions: inches [mm]
excluding mating plug(s)

Mounting

Mounting holes sized for ¼ inch or M6 bolts. The bolt length will be determined by the end-user's mounting plate thickness. The mounting flange of the controller is 0.63 inches (16 mm) thick.

If the module is mounted without an enclosure, it should be mounted vertically with connectors facing left and right to reduce likelihood of moisture entry.

The CAN wiring is considered intrinsically safe. The power wires are not considered intrinsically safe and so in hazardous locations, they need to be located in conduit or conduit trays at all times. The module must be mounted in an enclosure in hazardous locations for this purpose.

No wire or cable harness should exceed 30 meters in length. The power input wiring should be limited to 10 meters.

All field wiring should be suitable for the operating temperature range of the module.

Install the unit with appropriate space available for servicing and for adequate wire harness access (6 inches or 15 cm) and strain relief (12 inches or 30 cm).

Specifications are subject to update without notice.
Form: TDAX030400-10/08/08 (KMSCH:07/15/07)