


18 Digital Input CAN Controller

CAN (SAE J1939)

with Electronic Assistant® 

P/N: AX030300

Features:

- 8 digital inputs are user selectable from the following.
 - Active High/Active Low
 - PWM signal from sensors or diesel engine ECM's
 - Pulse (Hz or RPM)
 - Counter
- 10 digital inputs are user selectable as Active High/Active Low
- 12V, 24VDC input power (nominal) with rugged surge protection
- 1 CAN (SAE J1939)
- CANopen® module available on request (P/N: AX030301)
- 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 Controller: **AX030300**

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: **Axiomatic 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.

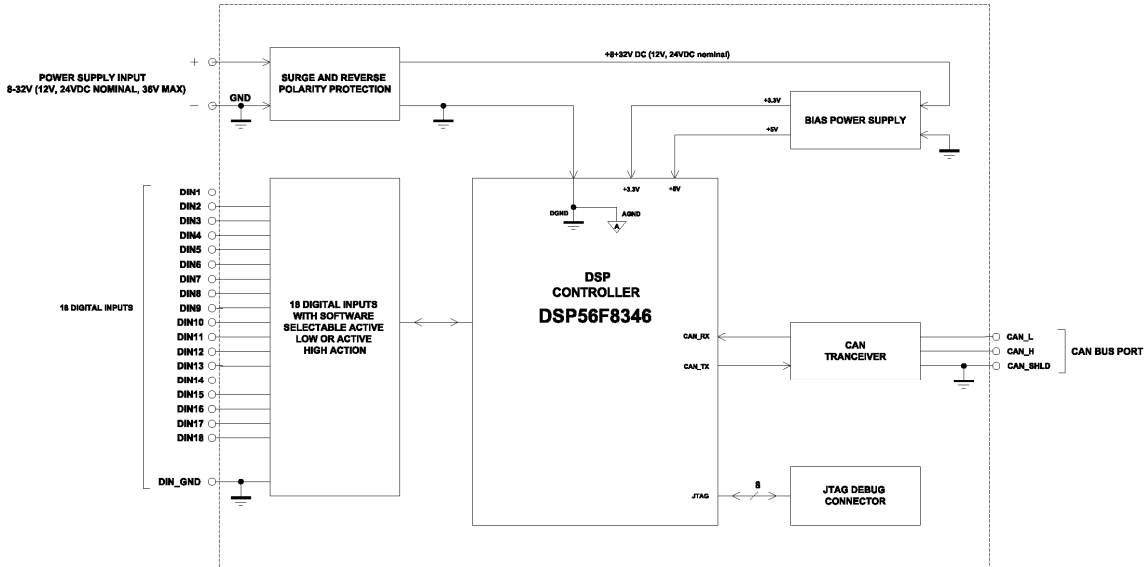
In Europe:

Axiomatic Technologies Oy
Höytämöntie 6
33880 LEMPÄÄLÄ - Finland
Tel. +358 3 3595 600
Fax. +358 3 3595 660
www.axiomatic.fi

In North America:

Axiomatic Technologies Corporation
5915 Wallace Street
Mississauga, ON Canada L4Z 1Z8
Tel. 1 905 602 9270
Fax. 1 905 602 9279
www.axiomatic.com

BLOCK DIAGRAM



Technical Specifications: Input Specifications

Power Supply Input - Nominal	12V, 24VDC nominal (8...32VDC power supply range) 36V maximum
Protection	Surge and reverse polarity protection are provided.
All Inputs	Up to 18 digital inputs are selectable by the user. Refer to Table 1.0. With the CAN model, AX030300, 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).
CAN Commands	SAE J1939 {CANopen® (model AX030301)}
Ground Connection	1 Digital GND connection is provided.

Table 1.0 - Inputs	
Digital Inputs	<p>Up to 18 digital inputs are available. The first 8 digital inputs can be configured for any one of the following options.</p> <ul style="list-style-type: none"> • Disable Input • Digital Input (Active High 10 KOhm or Active Low 10 KOhm) • PWM signal input (1-10,000 Hz, 0-100% D.C.) • Pulse Input (Hz or RPM) (50 to 10,000 Hz, 50 mV-3V RMS)* • 16-bit Counter Input <p>* NOTE: If the Input Maximum setpoint is set for a low frequency (<=50Hz), the controller will use a different technique to measure the frequency. Instead of measuring the pulses in the Measuring Window (this parameter is ignored) it will measure the time between rising edges of the signal. If more than 10 seconds pass without a transition, the input will be read as zero. The frequency range in this mode is 0.5-50Hz, with up to 2 decimal places of resolution.</p> <p>The last 10 digital inputs are user selectable as Active Low 10 KOhm or Active High 10 KOhm. Threshold 2.5V (Other values are available on request.) Hysteresis 1V</p>
Input Accuracy	<p>PWM, single channel: +/- 0.05% to +/- 1.25% (over the 500 Hz to 10 kHz range) Frequency/RPM, single channel: +/- 1% 16-bit counter, single channel: +/- 3 mSec (@50 Hz)</p>
Input Resolution	<p>PWM, single channel: +/- 0.05% to +/- 1.25%, 0 decimal place resolution NOTE: If the Input Maximum setpoint is set for a low frequency (<=50Hz), the controller will use a different technique to measure the frequency. Instead of measuring the pulses in the Measuring Window (this parameter is ignored) it will measure the time between rising edges of the signal. If more than 10 seconds pass without a transition, the input will be read as zero. The frequency range in this mode is 0.5-50Hz, with up to 2 decimal places of resolution.</p> <p>Frequency/RPM (single channel) 0.5 Hz to 50 Hz: +/- 0.01Hz, 0 decimal place resolution 50 Hz to 10kHz: +/- 1Hz, 0 decimal place resolution 16-bit counter, single channel: 1 pulse resolution</p>

Output Specifications

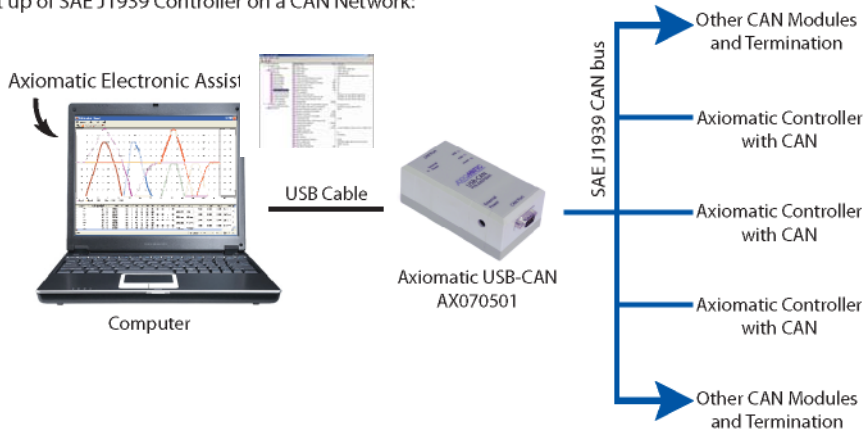
CAN Messages	SAE J1939 {CANopen® (model AX030301)}
--------------	---------------------------------------

General Specifications

Microprocessor	DSP56F8346
Control Logic	Standard embedded software (Application-specific logic available on request)
Quiescent Current Draw	0.06A @24Vdc
Communications	1 CAN port (SAE J1939) (Model AX030301 is CANopen®)
User Interface (PC-based)	<p>Electronic Assistant® for <i>Windows</i> operating systems It comes with a royalty-free license for use.</p> <p>The Electronic Assistant® requires an USB-CAN converter to link the device's CAN port to a <i>Windows</i>-based PC. An Axiomatic USB-CAN Converter AX070501 is available as part of the Axiomatic Configuration KIT.</p> <p>P/N: AX070502, the Axiomatic 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.</p>

Set up of an Axiomatic SAE J1939 Controller on a CAN Network:

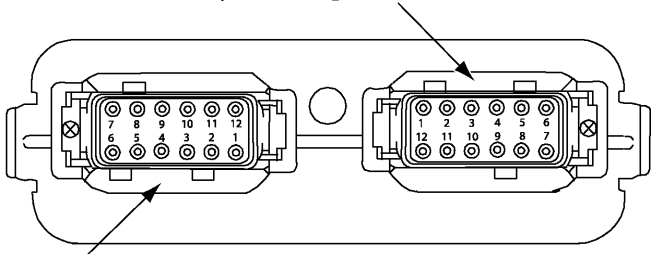
Set up of SAE J1939 Controller on a CAN Network:



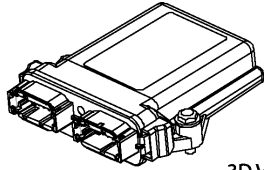
NOTES:

Network Termination: It is necessary to terminate the network with external termination resistors. The resistors are 120 Ohm, 0.25W minimum, metal film or similar type. They should be placed between CAN_H and CAN_L terminals at both ends of the network.

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 AX030300 is compliant with Bosch CAN protocol specification, Rev.2.0, Part B, and the following J1939 standards.</p> <table border="1" data-bbox="581 422 1365 1388"> <thead> <tr> <th colspan="2" data-bbox="581 422 1365 449"><i>Table 3: J1939 Compliance</i></th> </tr> <tr> <th data-bbox="581 449 808 499">OSI Network Model Layer</th> <th data-bbox="808 449 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). It also supports Proprietary B messaging (PGN 65280 to 65535), and uses a proprietary scheme described in the User Manual.	Network Layer	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).	Application Layer	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).
<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). It also supports Proprietary B messaging (PGN 65280 to 65535), and uses a proprietary scheme described in the User Manual.												
Network Layer	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).												
Application Layer	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).												

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.																																																				
Electrical Connections	<p>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.</p> <p>Use dielectric grease on the pins when installing the controller.</p> <p>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.</p> <p style="text-align: center;">Key Arrangement B (black)</p>  <p style="text-align: center;">Key Arrangement A (grey)</p> <p style="text-align: center;">FRONT VIEW 24 PIN RECEPTACLE</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">Grey Connector</th> <th colspan="2">Black Connector</th> </tr> </thead> <tbody> <tr><td>1</td><td>CAN_H</td><td>1</td><td>Digital Input 7</td></tr> <tr><td>2</td><td>CAN_L</td><td>2</td><td>Digital Input 8</td></tr> <tr><td>3</td><td>CAN_Shield</td><td>3</td><td>Digital Input 9</td></tr> <tr><td>4</td><td>GND</td><td>4</td><td>Digital Input 10</td></tr> <tr><td>5</td><td>Power -</td><td>5</td><td>Digital Input 11</td></tr> <tr><td>6</td><td>Power+</td><td>6</td><td>Digital Input 12</td></tr> <tr><td>7</td><td>Digital Input 6</td><td>7</td><td>Digital Input 18</td></tr> <tr><td>8</td><td>Digital Input 5</td><td>8</td><td>Digital Input 17</td></tr> <tr><td>9</td><td>Digital Input 4</td><td>9</td><td>Digital Input 16</td></tr> <tr><td>10</td><td>Digital Input 3</td><td>10</td><td>Digital Input 15</td></tr> <tr><td>11</td><td>Digital Input 2</td><td>11</td><td>Digital Input 14</td></tr> <tr><td>12</td><td>Digital Input 1</td><td>12</td><td>Digital Input 13</td></tr> </tbody> </table>	Grey Connector		Black Connector		1	CAN_H	1	Digital Input 7	2	CAN_L	2	Digital Input 8	3	CAN_Shield	3	Digital Input 9	4	GND	4	Digital Input 10	5	Power -	5	Digital Input 11	6	Power+	6	Digital Input 12	7	Digital Input 6	7	Digital Input 18	8	Digital Input 5	8	Digital Input 17	9	Digital Input 4	9	Digital Input 16	10	Digital Input 3	10	Digital Input 15	11	Digital Input 2	11	Digital Input 14	12	Digital Input 1	12	Digital Input 13
Grey Connector		Black Connector																																																			
1	CAN_H	1	Digital Input 7																																																		
2	CAN_L	2	Digital Input 8																																																		
3	CAN_Shield	3	Digital Input 9																																																		
4	GND	4	Digital Input 10																																																		
5	Power -	5	Digital Input 11																																																		
6	Power+	6	Digital Input 12																																																		
7	Digital Input 6	7	Digital Input 18																																																		
8	Digital Input 5	8	Digital Input 17																																																		
9	Digital Input 4	9	Digital Input 16																																																		
10	Digital Input 3	10	Digital Input 15																																																		
11	Digital Input 2	11	Digital Input 14																																																		
12	Digital Input 1	12	Digital Input 13																																																		
Mounting	<p>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.</p> <p>If the module is mounted without an enclosure, it should be mounted to reduce the likelihood of moisture entry.</p> <p>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.</p> <p>No wire or cable harness should exceed 30 meters in length. The power input wiring should be limited to 10 meters.</p> <p>All field wiring should be suitable for the operating temperature range of the module.</p> <p>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).</p>																																																				

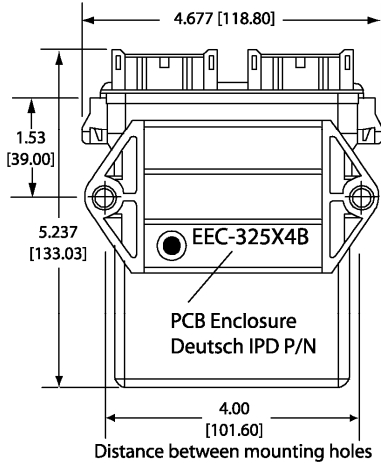
Weight	0.50 lbs. (0.23 kg)
Packaging and Dimensions	High Temperature Nylon housing - Deutsch IPD PCB Enclosure (EEC-325X4B) 4.62 x 5.24 x 1.43 inches 117.42 x 133.09 x 36.36 mm (W x L x H excluding mating plugs)



3D VIEW
Housing with 24 Pin Receptacle

HOUSING DIMENSIONS

Housing Material: High Temperature Nylon (Black)

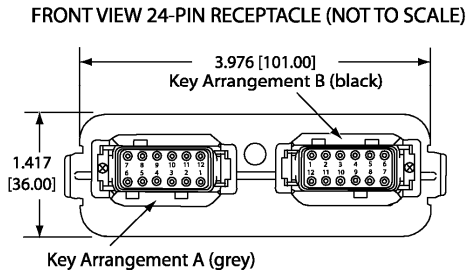


Height 1.368 [34.75] with 24 pin receptacle

Mounting Holes: \varnothing 0.29 [7.40] through 2 pl for 0.25 [6.00] fastener

Mounting flange: 16 mm [0.63 in] thick

BOTTOM VIEW



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)

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

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 www.axiomatic.com/service.html.

Form: TDAX030300-11/17/09