

TECHNICAL DATASHEET #TDAX030160
8 Digital Signal Inputs, CAN Controller

Digital, PWM or Hz Inputs
+8V Reference
+10V Reference
CAN (SAE J1939)
with Simulink®
with Electronic Assistant®

P/N: AX030160

Features:

- 8 user selectable digital inputs for interface with a joystick or other command input:
 - PWM (low or high frequency)
 - Frequency
 - Digital Voltage On/Off Signal
- +8V, 200 mA powers joystick or another device
- +10V, 200 mA powers joystick or another device
- 12V, 24Vdc (nominal) power input
- 1 CAN port (SAE J1939)
- Rugged packaging and connectors (TE Deutsch)
- Standard control logic
- CE marking (EMC Directive)
- Developed with Simulink®
- Electronic Assistant® for parameter configuration



Description: The controller has eight Digital Inputs that can be configured to measure Frequency, PWM duty cycle or digital voltage level (on/off). Measured input data can be sent to a SAE J1939 CAN Network as is or it can be used in the built-in Joystick logic block for generating J1939 Basic Joystick and Extended Joystick Message signals.

Rugged IP67 rated packaging in addition to a wide-ranging power supply input section for 12V or 24Vdc power suits applications in the harsh environment of mobile equipment with on-board battery power. All setpoints are user configurable using the Electronic Assistant®. The device operates with Simulink® for easy graphical programming in a model based simulation and development environment.

Applications: The controller is designed to meet the rugged demands of construction equipment and heavy duty industrial machine control applications.

Ordering Part Numbers:

SAE J1939 Controller: For baud rate, refer to the table below for the appropriate P/N.

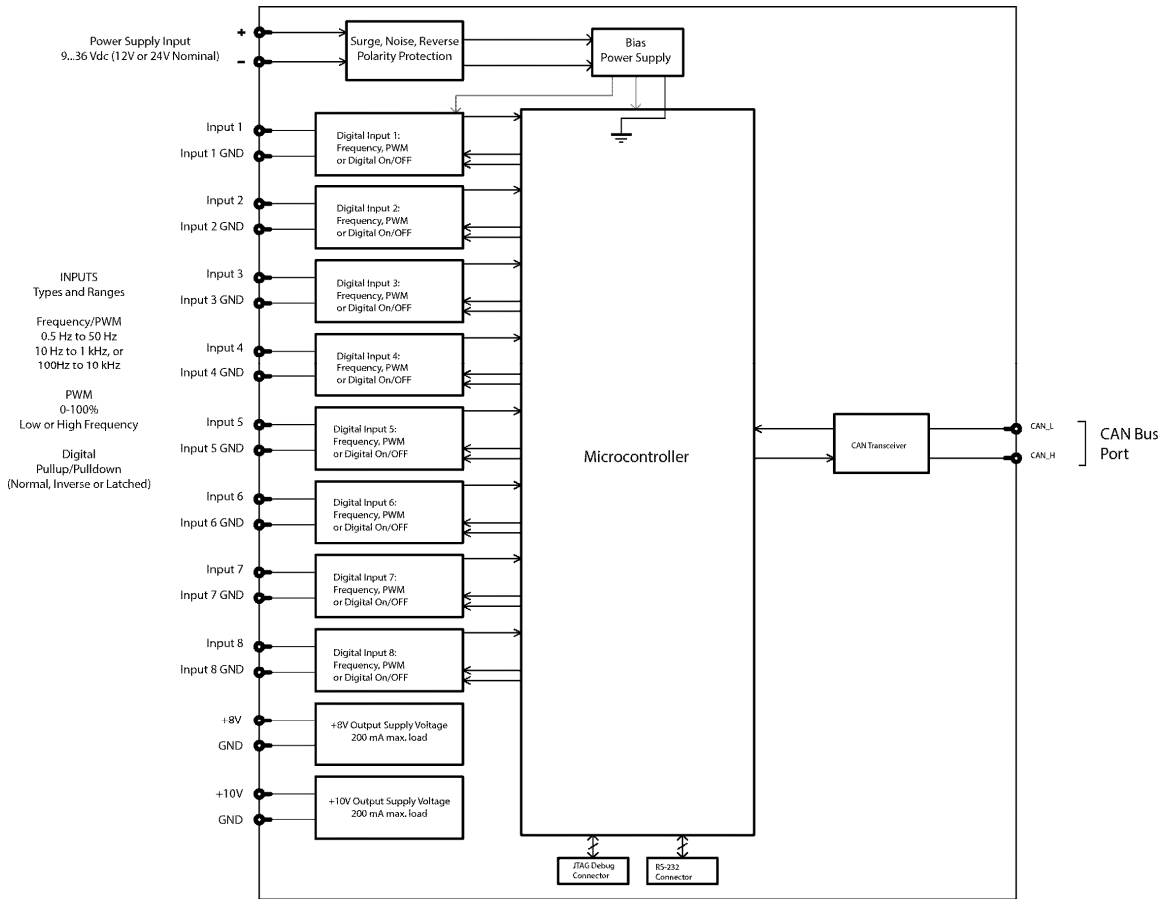
Model P/N	Baud Rate	Standard Reference
AX030160	250 kBit/s	J1939/11, J1939/15.
AX030160-01	500 kBit/s	J1939/14. New standard
AX030160-02	1Mbit/s	Non-standard

Accessories:

PL-DTM06-12SA-12SB Mating Plug Kit (1 DTM06-12S, DTM06-12SB, 2 W12S, 24 contacts)

Electronic Assistant® Configuration KIT: **AX070502**

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 www.axiomatic.com/service.html.

Power Input Specifications

Power Supply Input - Nominal	12 or 24Vdc nominal operating voltage 8...60 Vdc power supply range for voltage transients
Surge Protection	Provided
Reverse Polarity Protection	Provided
Quiescent Current	30mA @ 24Vdc; 40 mA @ 12Vdc, typical

Input Specifications

Inputs	<p>8 user selectable inputs (See Table 1.0.)</p> <ul style="list-style-type: none"> • PWM 12-bit (low or high frequency) • Frequency • Digital <p>All inputs are sampled every 1ms.</p>																												
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Input GND	<p>5 GND connections are provided. Grounds are connected internally.</p>																												

Output Specifications

Power Outputs	<p>One +8V reference, 200 mA maximum load One +10V reference, 200 mA maximum load</p>
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General Specifications

Operating Conditions	-40 to 85°C (-40 to 185°F)
Weight	0.50 lb. (0.23 kg)
Protection	IP67; Unit is conformal coated within the housing.
Microprocessor	STM32F205VGT6
CAN Interface	1 CAN port (SAE J1939)
Control Logic	Standard embedded software is provided.
Diagnostics	Diagnostics messages are provided over the CAN network.
User Interface	User configuration and diagnostics are provided with the Axiomatic Electronic Assistant®, p/n AX070502.
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.
Simulink®	Model AX030160 was developed using Simulink®. Simulink® is a model-based design tool from Mathworks®. Using Simulink®, the OEM machine designer may simulate their control system with the Axiomatic module included. This permits fine tuning of the design parameters and testing of functionality prior to machine prototype installation.
Approvals	CE marking
Vibration and Shock	Pending
Enclosure 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)

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. 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.</p> <p>All field wiring should be suitable for the operating temperature range.</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>
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Housing Dimensions and Typical Connections:

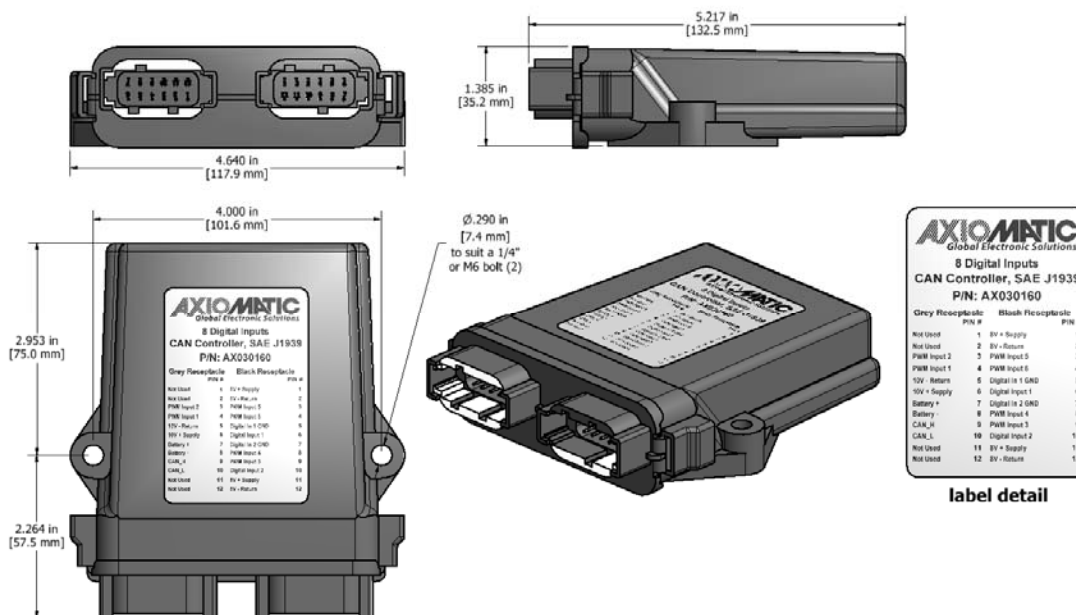


Table 5.0. Electrical Pin Out

Grey Connector PIN #	Function	Black Connector PIN #	Function
12	N.C.	12	+8V Reference GND
11	N.C.	11	+8V Reference
10	CAN_L	10	Digital Input 2
9	CAN_H	9	PWM Input 3
8	Battery -	8	PWM Input 4
7	Battery +	7	Digital Input 2 GND
6	+10V Reference	6	Digital Input 1
5	+10V Reference GND	5	Digital Input 1 GND
4	PWM Input 1	4	PWM Input 6
3	PWM Input 2	3	PWM Input 5
2	N.C.	2	+8V Reference GND
1	N.C.	1	+8V Reference

Control Logic	<p>The configurable properties of the ECU are divided into function blocks, namely Input Function Block, Joystick Logic Block, Diagnostic Function Block, Lookup Table Function Block, Programmable Logic Function Block, Math Function Block, DTC React Function Block, CAN Transmit Message Function Block and CAN Receive Message Function Block.</p> <p>Refer to the User Manual UMAX030160 for details.</p> <p>The AX030160 can be upgraded with new application firmware over the CAN bus using the Electronic Assistant. <i>For application-specific control logic, contact Axiomatic.</i></p>																																																																							
SAE J1939 Compliance	<p>The ECU is compliant with the following SAE J1939 standards.</p> <ul style="list-style-type: none"> • J1939 Recommended Practice for a Serial Control and Communications Vehicle Network, SAE, April 2011 • J1939/21 Data Link Layer, SAE, December 2010 • J1939/71 Vehicle Application Layer, SAE, March 2011 • J1939/73 Application Layer-Diagnostics, SAE, February 2010 • J1939/81 Network Management, SAE, May 2003 <p>It supports following PGNs from the standard.</p> <table border="1" data-bbox="553 743 1304 1631"> <thead> <tr> <th colspan="4">Table 4.0. SAE J1939 PGNs</th> </tr> <tr> <th colspan="4">From J1939-21 – Data Link Layer</th> </tr> </thead> <tbody> <tr> <td></td> <td>Request</td> <td>59904</td> <td>0x00EA00</td> </tr> <tr> <td></td> <td>Acknowledgement</td> <td>59392</td> <td>0x00E800</td> </tr> <tr> <td></td> <td>Transport Protocol – Connection Management</td> <td>60416</td> <td>0x00EC00</td> </tr> <tr> <td></td> <td>Transport Protocol – Data Transfer Message</td> <td>60160</td> <td>0x00EB00</td> </tr> <tr> <td></td> <td rowspan="2">Proprietary B</td> <td>From 65280</td> <td>0x00FF00</td> </tr> <tr> <td></td> <td>To 65535</td> <td>0x00FFFF</td> </tr> <tr> <th colspan="4">From J1939-73 – Diagnostics</th> </tr> <tr> <td></td> <td>DM1 – Active Diagnostic Trouble Codes</td> <td>65226</td> <td>0x00FECA</td> </tr> <tr> <td></td> <td>DM2 – Previously Active Diagnostic Trouble Codes</td> <td>65227</td> <td>0x00FECB</td> </tr> <tr> <td></td> <td>DM3 – Diagnostic Data Clear/Reset for Previously Active DTCs</td> <td>65228</td> <td>0x00FECC</td> </tr> <tr> <td></td> <td>DM11 – Diagnostic Data Clear/Reset for Active DTCs</td> <td>65235</td> <td>0x00FED3</td> </tr> <tr> <th colspan="4">From J1939-81 – Network Management</th> </tr> <tr> <td></td> <td>Address Claimed/Cannot Claim</td> <td>60928</td> <td>0x00EE00</td> </tr> <tr> <td></td> <td>Commanded Address</td> <td>65240</td> <td>0x00FED8</td> </tr> <tr> <th colspan="4">From J1939-71 – Vehicle Application Layer</th> </tr> <tr> <td></td> <td>Software Identification</td> <td>65242</td> <td>0x00FEDA</td> </tr> </tbody> </table>	Table 4.0. SAE J1939 PGNs				From J1939-21 – Data Link Layer					Request	59904	0x00EA00		Acknowledgement	59392	0x00E800		Transport Protocol – Connection Management	60416	0x00EC00		Transport Protocol – Data Transfer Message	60160	0x00EB00		Proprietary B	From 65280	0x00FF00		To 65535	0x00FFFF	From J1939-73 – Diagnostics					DM1 – Active Diagnostic Trouble Codes	65226	0x00FECA		DM2 – Previously Active Diagnostic Trouble Codes	65227	0x00FECB		DM3 – Diagnostic Data Clear/Reset for Previously Active DTCs	65228	0x00FECC		DM11 – Diagnostic Data Clear/Reset for Active DTCs	65235	0x00FED3	From J1939-81 – Network Management					Address Claimed/Cannot Claim	60928	0x00EE00		Commanded Address	65240	0x00FED8	From J1939-71 – Vehicle Application Layer					Software Identification	65242	0x00FEDA
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Notes:

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

Electronic Assistant® is a registered U.S. trade mark of Axiomatic Technologies Corporation.

Simulink® is a registered trademark of The Mathworks, Inc.

Form: TDAX030160-08/25/17