TECHNICAL DATASHEET #TDAX031201

11:9 CAN CONTROLLER

11 Inputs (Analog, Digital, Magnetic Pick Up, Universal Signal)
4 Relay, 4 Analog, 1 Valve Driver Outputs
2 CANopen®

P/N: AX031201

Features:

- 12V or 24Vdc nominal input power with surge and transient protection
- Reverse polarity, overvoltage, undervoltage and short circuit protections
- Input and output isolation

- 4 Isolated Analog (0-5V, 0-10V, 4-20 mA or 0-20 mA) or Digital inputs
- 2 Isolated Digital Inputs
- 1 Magnetic Pick Up Input (0.5 Hz to 10 kHz, 100 mV to 100 Vrms)
- 4 Universal Inputs (0-1V, 0-2.5V, 0-5V, 0-10V Voltage; 4-20 mA, 0-20 mA Current; 30Ω to 250 kΩ Resistive; 0.5 Hz to 10 kHz Frequency; RPM; PWM; or Digital)

- 4 Isolated Analog Outputs (0-5V or 0-10V Voltage; or 4-20 mA, 0-20 mA Current)
- 4 Relay Outputs (5A@250VAC or 220VDC, NO)
- 1 Output (2A) to drive a proportional or ON/OFF hydraulic valve

- 2 CANopen® ports
- -40 to +85 °C operating temperature
- EMC compliant, CE/UKCA marking
- 48-pin enclosure and connectors (TE Deutsch equivalents)
- IP67 rating
- .EDS provided to interface to standard CANopen® tools

Applications:

- power gen set engine control systems
- oil and gas equipment automation
- off-highway machine automation

Ordering Part Numbers:
CAN Controller, CANopen®: **AX031201**
Mating Plug Kit: **AX070123**

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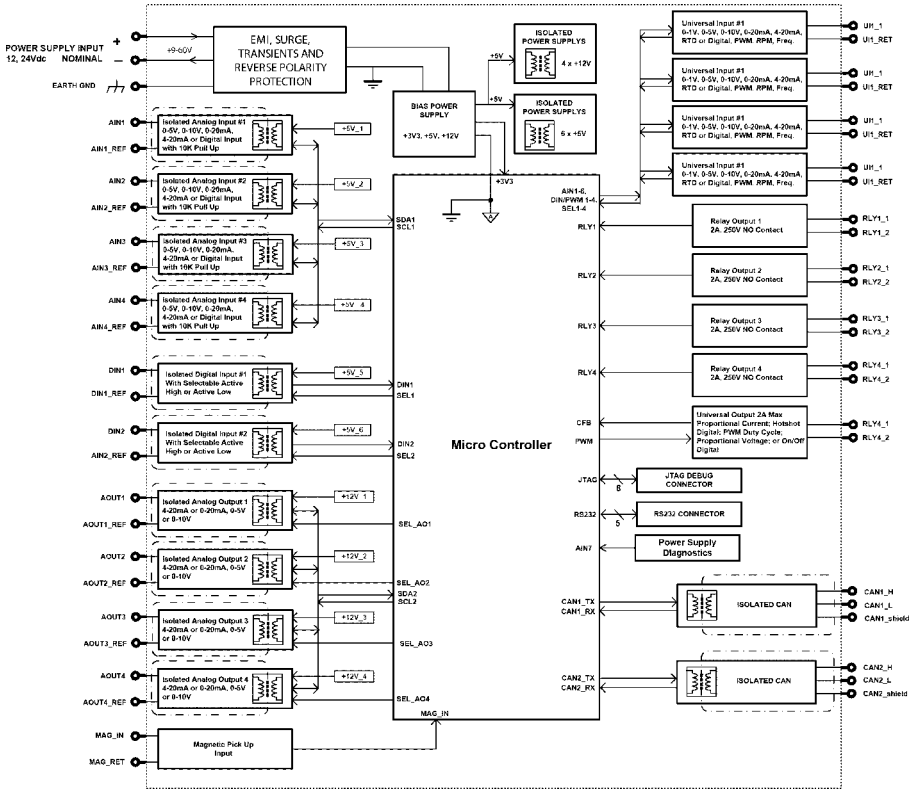
Technical Specifications:

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 [https://www.axiomatic.com/service/.](https://www.axiomatic.com/service/)

Block Diagram



The controller belongs to a family of Axiomatic smart controllers with configurable internal architecture. This provides users with flexibility, allowing them to build their own custom controller with a required functionality from a set of predefined internal functional blocks using the commercially available software tools. Application programming is performed through the CAN interface, without disconnecting the controller from the user's system.

Inputs

Power Supply Input	12 Vdc or 24 Vdc nominal (9…60 Vdc power supply range) Shutdown voltage is 7.5 Vdc.
Protection	Surge and transient protection Reverse polarity protection Overvoltage protection is up to 80 V.
Inputs	11 Inputs, user selectable: 4 Isolated Analog Inputs 2 Isolated Digital Inputs 1 Magnetic Pick Up Input 4 Universal Inputs Refer to Table 1.0. Inputs and Power are isolated from the outputs and CAN.
Input Grounds	Provided

Table 1.0 – Inputs – User Programmable Options

Analog Inputs	Four fully isolated inputs selectable as : Voltage, Current or Digital types 12-bit Analog to Digital (voltage, current) Inputs are sampled every 1 msec. Protected against shorts to GND or +Vcc
Voltage Type	0-5 V (Impedance 200 KOhm) 0-10 V (Impedance 150 KOhm) 1mV resolution, accuracy +/- 1% error
Current Type	0-20 mA (Impedance 125 Ohm) 4-20 mA (Impedance 125 Ohm) 6 uA resolution, accuracy +/- 1% error Current sense resistor 124Ω
Digital Type	Active High or Active Low
Digital Input	Two fully isolated Active High or Active Low Inputs Configurable 10kΩ pullup or pulldown resistor Pullup at 5VDC, pulldown to reference.
Magnetic Pick Up Input	One input Range: 0.5 Hz to 10 kHz 100mV to 100V RMS
Universal Inputs	Four fully independent inputs selectable as: Voltage; Current; Resistive; Frequency; RPM; PWM; or Digital types 12-bit Analog to Digital (voltage, current, resistive) 15-bit Timer (frequency, RPM, PWM) Protected against shorts to GND or +Vcc
Voltage Type	0-1V, 0-2.5V, 0--5V or 0-10V 1mV resolution, accuracy +/- 1% error
Current Type	0-20mA or 4-20mA 1uA resolution, accuracy +/- 2% error Current sense resistor 124Ω
Resistive Type	Self-calibrating for range of 30 Ω to 250 kΩ 1Ω resolution, accuracy +/- 1% error
PWM Input	1MΩ Impedance 0 to 100% 100 Hz to 10 kHz 0.01% resolution, accuracy +/- 1% error
Frequency/RPM Input	0.5 Hz to 50 Hz; 0.01 Hz resolution 10 Hz to 1 kHz; 0.1Hz resolution 100 Hz to 10 kHz; 1 Hz resolution accuracy +/- 1% error
Digital Input	Active High or Active Low with 22 kOhm pull-up or pull-down Rated up to 42V

Outputs

<table>
<tr><td>Outputs</td><td>4 Isolated Analog Outputs
4 Relay Outputs
1 Valve Driver Output

The outputs are user selectable as follows. Refer to Table 2.0.
<table>
<tr><td colspan="2">Table 2.0: Outputs</td></tr>
<tr><td>Analog Outputs:</td><td>Four fully isolated analog outputs as: Voltage or Current
12-bit Digital to Analog (voltage, current)
Protected against shorts to GND or +Vcc

<u>Voltage Output:</u>
0-5 Vdc or 0-10 Vdc
1mV resolution, accuracy +/- 1% error
<table>
<tr><td>Output Range</td><td>Maximum load</td></tr>
<tr><td>0-5V</td><td>1kΩ</td></tr>
<tr><td>0-10V</td><td>10kΩ</td></tr>
</table>
<u>Current Output:</u>
0-20 mA or 4-20 mA
Max. load resistance is < 350 Ohms
Compliance Voltage is 7 V.
6.1 uA resolution, accuracy +/- 1% error</td></tr>
<tr><td>Relay Outputs</td><td>Four Relay Outputs
Max. 5A, 250VAC or 220VDC, NO Contact</td></tr>
<tr><td>Valve Driver Output</td><td>One fully independent software controlled output selectable as:
• Proportional Current;
• Hotshot Digital;
• PWM Duty Cycle;
• Proportional Voltage;
• or On/Off Digital
Half-bridge output, current sensing, grounded load.
High side sourcing up to 2A

Current Outputs: 1mA resolution, accuracy +/- 2% error

Voltage Outputs: 0.1V resolution, accuracy +/- 5% error
Average output based on unit power supply
High frequency drive at 25kHz

PWM Outputs: 0.1% resolution, accuracy +/- 0.1% error

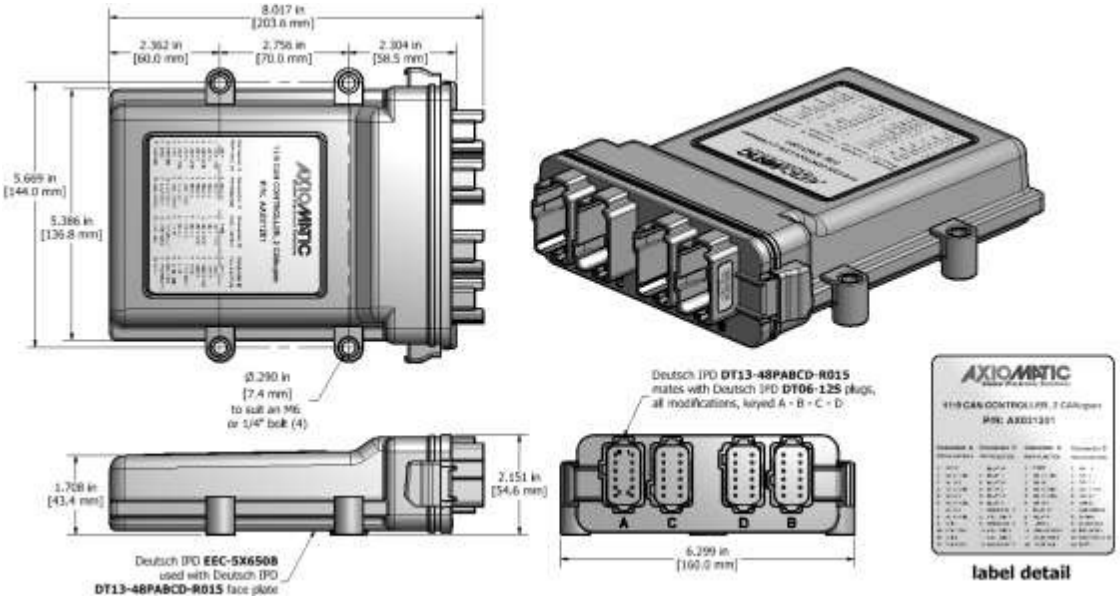
Digital On/Off:
Load at supply voltage must not draw more than 2A.</td></tr>
</table>
</td></tr>
<tr><td>Isolation</td><td>300 Vrms
The outputs are isolated from the inputs.
The CAN bus port is isolated from both inputs and outputs.</td></tr>
<tr><td>Protection for Output Terminals</td><td>Fully protected against short circuit to output ground and +Vcc.
Unit will fail safe in the case of a short circuit condition, self-recovering when the short is removed.</td></tr>
</table>

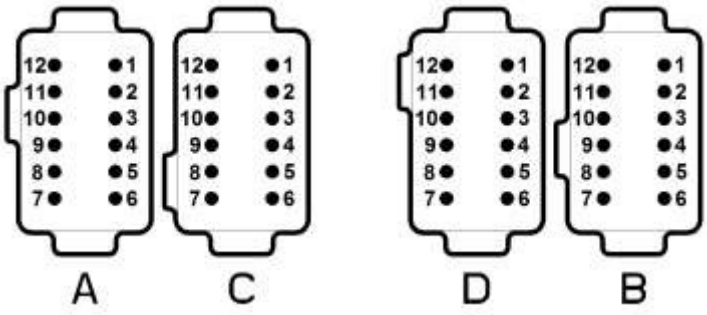
General Specifications

Microcontroller	STM32 32-bit, 512 kByte flash memory
Typical Quiescent Current	97 mA @ 24Vdc
Compliance	CE/UKCA marking
Vibration Compliance	Random Vibration: 7.68 Grms peak Sinusoidal Component: 10 g peak Based on MIL-STD-202G, Methods 204G, 214A and 213B
Control Logic	Standard embedded software is provided. *(Application-specific control logic or factory programmed set point file on request)*
Communications	2 Isolated CANopen® ports
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.

User Interface	.EDS provided to interface to standard CANopen® tools
Operating Conditions	-40 to 85 °C (-40 to 185 °F)
Storage Temperature	-55 to 125 °C (-67 to 257°F)
Protection	IP67
Weight	1.35 lbs. (0.612 kg)
Enclosure	High Temperature Nylon Enclosure – (equivalent TE Deutsch P/N: EEC-5X650B) 5.67 x 7.92 x 2.15 inches (144.0 x 201.3 x 54.6 mm) L x W x H including integral connector Refer to the dimensional drawing.
Installation	For mounting information, refer to the dimensional drawing. 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 0.25 inches (6.35 mm) thick. If the module is mounted without an enclosure, it should be mounted to reduce the likelihood of moisture entry. 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). Wires should be of the appropriate gauge to meet requirements of applicable electrical codes and suit the specifications of the connector. The module must be mounted in an enclosure in hazardous locations. All field wiring should be suitable for the operating temperature range of the module. All chassis grounding should go to a single ground point designated for the machine and all related equipment.

Dimensional Drawing



Electrical Connections	48-pin connector (equivalent TE Deutsch P/N: DT13-48PABCD-R015)  Table 3 - Electrical Pin Out
Mating Plugs	Mates with the following TE Deutsch P/N equivalents: DT06-12SA Plug, DT 12 Way A Key DT06-12SB Plug, DT 12 Way B Key DT06-12SC Plug, DT 12 Way C Key DT06-12SD Plug, DT 12 Way D Key A set of these mating plugs is available, ordering P/N: AX070123.

Connector A		Connector C		Connector D		Connector B	
Pin #	**Function**	**Pin #**	**Function**	**Pin #**	**Function**	**Pin #**	**Function**
1	A/D IN 1	1	RELAY 1 +	1	P OUT	1	BATT +
2	A/D IN 1 GND	2	RELAY 1 -	2	UNI IN 1 RTN	2	CAN 1 L
3	A/D IN 2	3	RELAY 2 +	3	UNI IN 1	3	CAN 1 H
4	A/D IN 2 GND	4	RELAY 2 -	4	UNI IN 2 RTN	4	CAN 1 SH
5	A/D IN 3	5	RELAY 3 +	5	UNI IN 3 RTN	5	CAN 2 H
6	A/D IN 3 GND	6	RELAY 3 -	6	UNI IN 3	6	CAN 2 L
7	A/D IN 4	7	A OUT 1	7	RELAY 4 +	7	CAN 2 SH
8	A/D IN 4 GND	8	A OUT GND 1	8	RELAY 4 -	8	UNI IN 4
9	D IN 1	9	A OUT 2	9	UNI IN 2	9	UNI IN 4 RTN
10	D IN 1 GND	10	A OUT GND 2	10	A OUT 4	10	MAG IN GND
11	D IN 2	11	A OUT GND 3	11	A OUT GND 4	11	MAG PICK-UP IN
12	D IN 2 GND	12	A OUT 3	12	P OUT GND	12	BATT -

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Form: TDAX031201-05/31/23