Preliminary
TECHNICAL DATASHEET #TDAX021211A

CAN to 10 Outputs Valve Controller

12, 24 or 48 VDC
10 Universal Outputs (2.5 A)
CANopen®
P/N: AX021211A

Features:

- Command messages via CAN bus
- 10 universal outputs of up to 2.5 A are user selectable from the following types:
  - Output Disabled
  - Proportional Current
  - Hotshot Digital
  - On/Off Digital
  - Proportional Voltage
  - PWM Duty Cycle
- Operates at 12, 24 or 48 VDC nominal input power (in 9 to 60 VDC range)
- 1 CAN port (CANopen®)
- SAE J1939 model (P/N: AX021210A)
- Hardware is also available as a platform for application-specific software
- Rugged packaging and connectors
- CE / UKCA mark

Applications:

- Off-highway construction equipment
- Municipal vehicles

Ordering Part Numbers:

CAN to 10 Output Valve Controller, CANopen® P/N: **AX021211A**

Accessories:
EDS File
Mating Plug Kit P/N: **PL-DTM06-12SA-12SB**

Description:

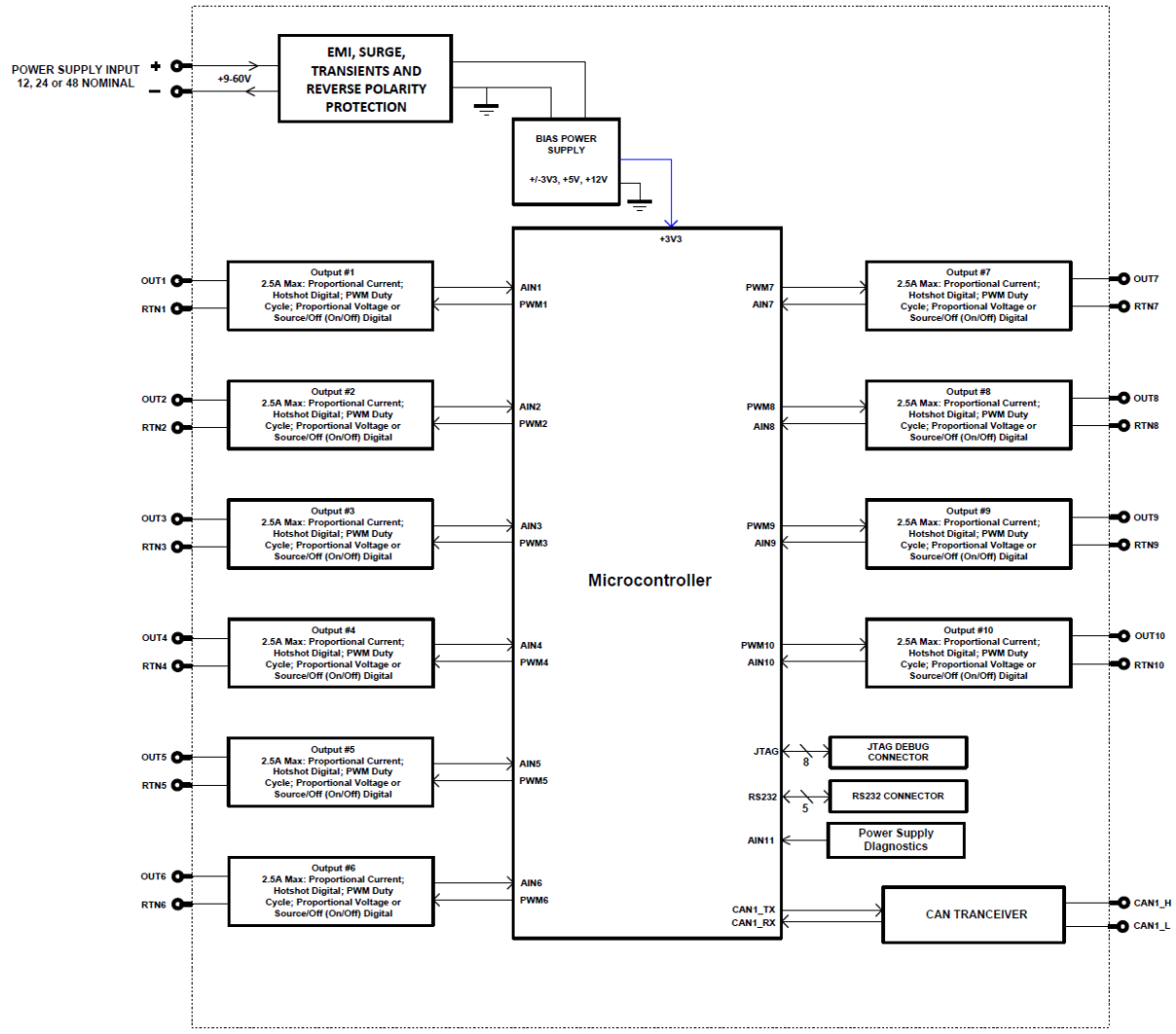
The controller features 1 CAN port for controlling the outputs and diagnostics over the CAN bus. It accepts input power supply voltage of 12, 24, or 48 VDC nominal. Using the CAN network, it can provide control of up to ten outputs, configured for a wide variety of responses and up to 2.5 A per channel (max 7 A per module). It can drive proportional valves, on/off valves or provide a hotshot control profile. PWM signal or proportional voltage outputs are also user selectable.

Standard software is provided. The sophisticated microcontroller can accommodate complex application-specific control algorithms for advanced machine control on request. Rugged packaging and power supply surge protection suits the harsh environment of mobile equipment with on-board battery power.

Axiomatic Technologies Oy
Höytämöntie 6
33880 LEMPÄÄLÄ, Finland
Tel. +358 103 375 750
salesfinland@axiomatic.com
www.axiomatic.fi

Axiomatic Technologies Corporation
1445 Courtneypark Dr. E.
Mississauga, ON Canada L5T 2E3
Tel. 1 905 602 9270
sales@axiomatic.com
www.axiomatic.com

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 https://www.axiomatic.com/service/.

Power Supply

Power Supply Input	12, 24 or 48 VDC nominal (9 to 60 VDC range)
Quiescent Current	130 mA @ 12 V, 78.57 mA @ 24 V, 56.77 mA @ 48 V typical
Protections	Surge and transient protection is provided. Reverse polarity protection is provided. Over-voltage protection is provided. Under-voltage protection is provided.

Inputs

CAN commands	CANopen® No physical inputs available SAE J1939 Model, P/N: **AX020210A**
Baud Rate	User configurable as 1 Mbit/s; 800 kbit/s; 500 kbit/s; 250 kbit/s; 125 kbit/s; 50 kbit/s; 20 kbit/s; or 10 kbit/s

Outputs

Universal Outputs	High side (sourcing) Half-bridge, current sensing, grounded load 10 outputs, 12, 24 or 48 VDC Fully independent, software controlled High frequency drive at 25 kHz Each output is configurable up to 2.5 A. Notes: • Load at supply voltage must not draw more than 2.5 A. • The number of outputs ON at one time is limited by the rating of the contacts (pins on the connector). • The maximum total current draw permitted on the power supply input pins at any one time is 7 A @ 24 VDC. Failure to do so will result in unpredictable damage to unit.
Output Type	The user can select between the following outputs. • Output disabled • Proportional current (0 to 2.5 A) • Hotshot digital (0 to 2.5 A, 0 to 10000 ms) • On/Off digital (0 to 2.5 A), Sourcing from power supply or output off • Proportional voltage (0 to 60 V) • PWM duty cycle (150 to 5000 Hz, 0 to 100%)
Output Adjustments	Digital Current: 0 to 2500 mA Hotshot Hold Time: 0 to 10000 ms Proportional Current: 0 to 2500 mA Proportional Voltage: 0 to 60 V PWM Duty Cycle: 0 to 100% PWM Frequency: 150 to 5000 Hz Ramp Up: 0 to 10000 ms Ramp Down: 0 to 10000 ms Dither Frequency: 50 to 400 Hz Dither Amplitude: 0 to 500 mA
Resolution and Accuracy	Current Outputs: 1 mA resolution; +/- 1% error Voltage Outputs: 0.1 V resolution; +/- 5% error PWM Outputs: 0.1% resolution, +/- 0.1% error
Protection	Overcurrent protection is provided. Short circuit protection is provided. Outputs are separately protected against short circuits to both power and GND. If the current at the output exceeds 6 A (in case of a short circuit), the protection circuitry will shut off the output signal, regardless of what type of output mode had been selected for that channel.
Error Detection	EMCY code generation (object 1003h) and fault reaction is possible (1029h) when an open or short circuit is detected at the output (current mode only).

General Specifications

<table>
<tr><td>Microcontroller</td><td>STM32H742VIT6</td></tr>
<tr><td>Control Logic</td><td>Standard embedded software. Refer to the User Manual.
User programmable functionality using SDO object access, per CiA DS-301
Application-specific software is available on request.

An output can be controlled either by an on-board control signal (such the result from a lookup table or a math function) or a CANopen® object that has been mapped to an RPDO. By default, analog outputs are setup to respond to the corresponding CANopen® RPDO message. By default, analog outputs are configured as proportional current types. Outputs can be configured to respond to any control source found in the list of configurable options in Table 1.0.

<table>
<tr><th colspan="2">Table 1.0 - Configurable Control Sources</th></tr>
<tr><th>Value</th><th>Meaning</th></tr>
<tr><td>0</td><td>Control Source Not Used (Ignored)</td></tr>
<tr><td>1</td><td>CANopen® Message (RPDO)</td></tr>
<tr><td>2</td><td>Constant Function Block</td></tr>
<tr><td>3</td><td>PID Control Function Block</td></tr>
<tr><td>4</td><td>Lookup Table Function Block</td></tr>
<tr><td>5</td><td>Mathematical Function Block</td></tr>
<tr><td>6</td><td>Programmable Logic Function Block</td></tr>
<tr><td>7</td><td>Output Commanded Field Value</td></tr>
<tr><td>8</td><td>Output Feedback Field Value</td></tr>
<tr><td>9</td><td>Power Supply Measured</td></tr>
<tr><td>10</td><td>Processor Temperature Measured</td></tr>
</table>
</td></tr>
<tr><td>Communications</td><td>1 CAN port (CANopen)

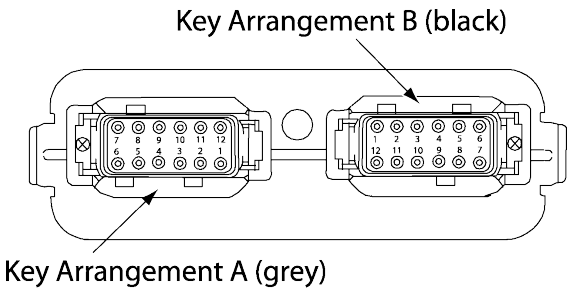
The controller’s object dictionary is compatible with the CiA DS-404 device profile (Device profile for measurement devices and closed-loop controllers). In addition to the standard objects for this device profile, the controller also includes a number of manufacturer specific objects to extend the functionality beyond that of the basic profile.

The controller is compliant with the following CAN in Automation (CiA) standards.
<table>
<tr><td>[DS-301]</td><td>CiA DS-301 V4.02 – CANopen® Application Layer and Communication Profile. CAN in Automation 2005</td></tr>
<tr><td>[DS-404]</td><td>CiA DS-404 V1.2 – Device Profile for Measurement Devices and Closed-Loop Controllers. CAN in Automation 2002</td></tr>
<tr><td>[DS-305]</td><td>CiA DS-305 V2.0 – Layer Setting Service (LSS) and Protocols. CAN in Automation 2006</td></tr>
</table>
</td></tr>
<tr><td>User Interface</td><td>All objects are user-configurable using standard commercially available tools that can interact with a CANopen® Object Dictionary via an .EDS file.</td></tr>
</table>

<table>
<tr><td>Diagnostics – CAN Network</td><td>The controller can detect and flag open and short circuit loads and provides this information to the CAN network. The controller supports a number of EMCY (Emergency Frame Codes) as defined by DS-404 and DS-301 and these include error codes. Refer to the User Manual for details.</td></tr>
<tr><td>Compliance</td><td>CE / UKCA marking
RoHS</td></tr>
<tr><td>Vibration</td><td>Pending
MIL-STD-202G, Test 204D and 214A
10.86 Grms (Random) 15 g peak (Sine)</td></tr>
<tr><td>Operating Temperature</td><td>-40 to 85°C (-40 to 185°F)</td></tr>
<tr><td>Storage Temperature</td><td>-40 to 125°C (-40 to 257°F)</td></tr>
<tr><td>Weight</td><td>0.60 lb. (0.27 kg) preliminary</td></tr>
<tr><td>Protection</td><td>IP67</td></tr>
<tr><td>Network Termination</td><td>It is necessary to terminate the network with external termination resistors. The resistors are 120 Ω, 0.25 W minimum, metal film or similar type. They should be placed between CAN_H and CAN_L terminals at both ends of the network.</td></tr>
<tr><td>Electrical Connections</td><td>24-pin receptacle (equivalent TE Deutsch P/N: DTM13-12PA-12PB-R008)

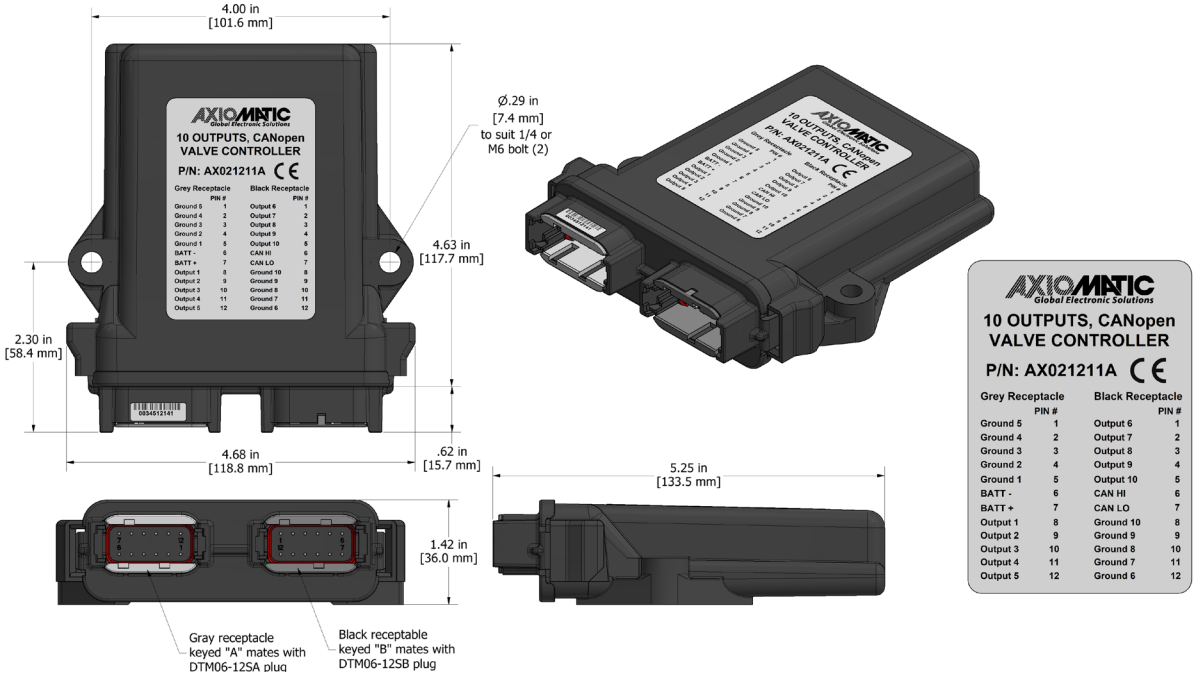
Mating Plug Kit P/N: PL-DTM06-12SA-12SB (includes 1 DTM06-12SA, 1 DTM06-12SB, 2 WM12S wedgelocks and 24 0462-201-20141 contacts).

20 AWG wire is recommended for use with contacts 0462-201-20141.

<table>
<tr><th colspan="2">Grey Connector</th><th colspan="2">Black Connector</th></tr>
<tr><th>Pin #</th><th>Function</th><th>Pin #</th><th>Function</th></tr>
<tr><td>1</td><td>Ground 5</td><td>1</td><td>Output 6</td></tr>
<tr><td>2</td><td>Ground 4</td><td>2</td><td>Output 7</td></tr>
<tr><td>3</td><td>Ground 3</td><td>3</td><td>Output 8</td></tr>
<tr><td>4</td><td>Ground 2</td><td>4</td><td>Output 9</td></tr>
<tr><td>5</td><td>Ground 1</td><td>5</td><td>Output 10</td></tr>
<tr><td>6</td><td>Power -</td><td>6</td><td>CAN_H</td></tr>
<tr><td>7</td><td>Power +</td><td>7</td><td>CAN_L</td></tr>
<tr><td>8</td><td>Output 1</td><td>8</td><td>Ground 10</td></tr>
<tr><td>9</td><td>Output 2</td><td>9</td><td>Ground 9</td></tr>
<tr><td>10</td><td>Output 3</td><td>10</td><td>Ground 8</td></tr>
<tr><td>11</td><td>Output 4</td><td>11</td><td>Ground 7</td></tr>
<tr><td>12</td><td>Output 5</td><td>12</td><td>Ground 6</td></tr>
</table></td></tr>
<tr><td>Enclosure and Dimensions</td><td>High Temperature Nylon PCB Enclosure - TE Deutsch P/N: EEC-325X4B
4.68 x 5.25 x 1.42 inches (118.80 x 133.5 x 35.98 mm)
(W x L x H excluding mating plugs)
Refer to dimensional drawing below.</td></tr>
<tr><td>Mounting</td><td>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 in (16 mm) thick. If the module is mounted without an enclosure, it should be mounted to reduce the 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. 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 in or 15 cm) and strain relief (12 in or 30 cm).</td></tr>
</table>

Dimensional Drawing



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

Form: TDAX021211A-07/04/2025