

TECHNICAL DATASHEET #TDAX024001

4 INPUTS, 2 OUTPUTS SERVO VALVE CONTROLLER

4 Signal Inputs
2 Bi-directional 400 mA Outputs
2 Signal Outputs
2 Reference Voltages
Isolated CANopen®
P/N: AX024001

Features:

- 2 bi-directional outputs (-400 mA to +400 mA) can drive two servo valves independently.
- 2 signal outputs for feedback to a PLC or other similar device
- 1 isolated CANopen® port for networking
- 2 analog signal inputs selectable as:
 - 0-5 V, 0-10 V, +/- 5 V, +/- 10 V
 - 4-20 mA, 0-20 mA
- 2 analog/ digital inputs are available as:
 - 0-5 V, or 0-10 V
 - 4-20 mA, or 0-20 mA
 - PWM
 - Frequency
 - Digital
- 2 reference voltages (one +5V and one +10V) to power sensors
- Accepts 8 to 36 VDC. Appropriate for battery powered machine applications.
- CE / UKCA marking
- Operates from -40 to 85°C (-40 to 185°F)
- Conformally coated circuitry inside a rugged, IP67 rated enclosure for harsh environments



Applications:

- Servo valve control in motion control, automation
- Off-highway and other machines for rugged environments

Ordering Part Numbers

Valve Controller, CANopen®: **AX024001**

Valve Controller, SAE J1939 (250 kbps): **AX024000**

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

Description

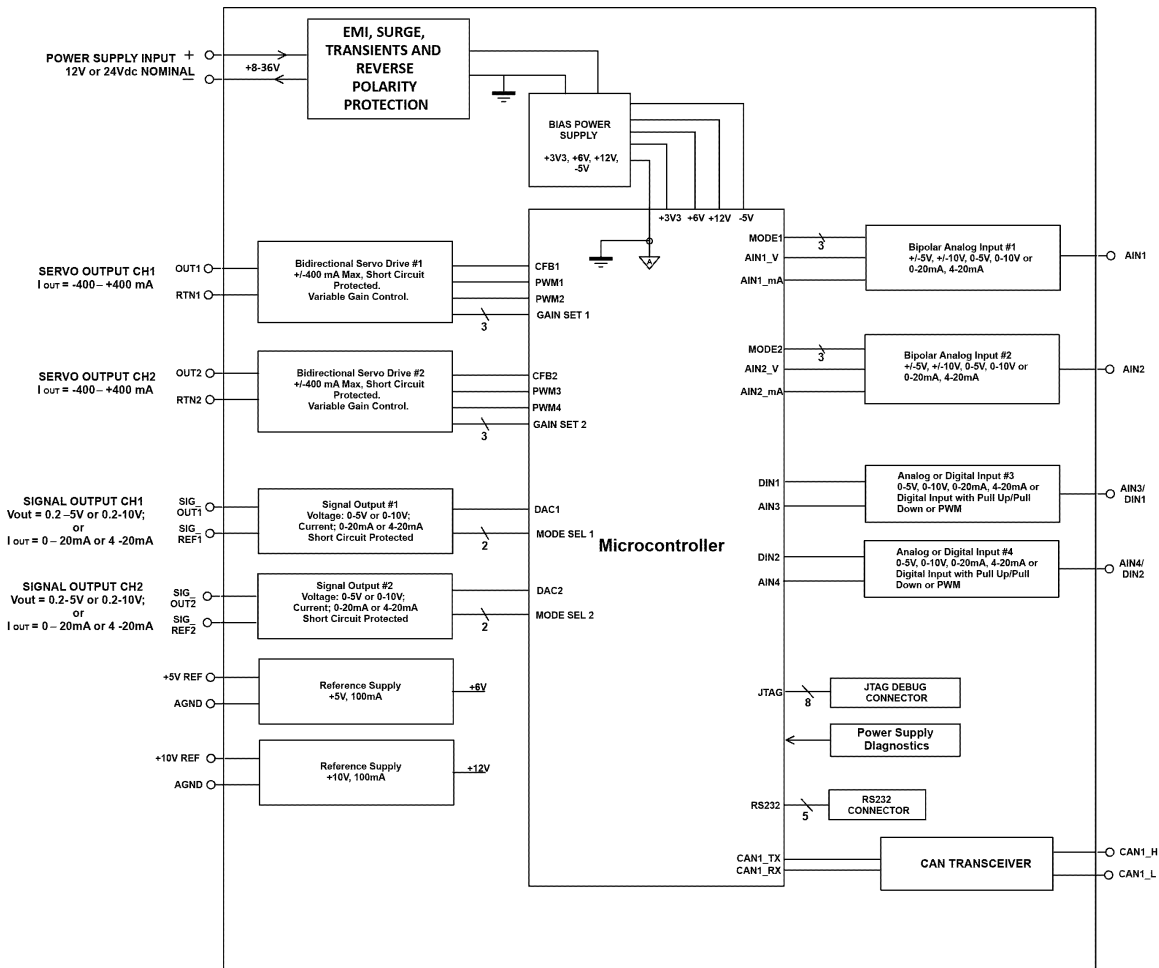
The 4 Inputs 2 Outputs Servo Controller is designed for versatile control of two servo outputs to directly drive servos or other bidirectional loads. In addition to the two servo outputs, there are two signal outputs with voltage and current signal generation. The controller's flexible circuit design gives the user a wide range of configurable input types. The powerful control algorithms allow the user to program the controller for a wide range of applications without the need for custom software. The controller has two universal inputs that can be configured to measure analog voltage or current, frequency/PMW or digital signal and two analog inputs that can be

configured to measure current and both positive and negative voltages. Measured input data can be sent to a CANopen® CAN Network or used to drive outputs directly or through the configurable control algorithms.

The servo outputs are full H-bridge types with the capability of driving up to 400 mA through the load in both directions. The signal outputs can be configured to source voltage signals up to 10 V and current signals up to 20 mA. Any of the four outputs can be configured to use any of the onboard inputs as either a control signal or an enable signal as well as CANopen® Network data. An Electronic Data Sheet (EDS) file is provided, containing information on the CANopen® object dictionary.

Packaged for rugged environments, the controller has an IP67 rating and is suitable for high vibration applications. It has CE / UKCA marking.

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.

Inputs

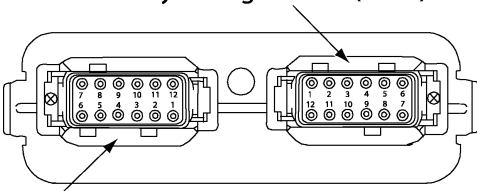
| Power Supply Input | 12 or 24 VDC nominal (8 to 36 VDC power supply range) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|----------------|-------|-----|-------|--------------|---|----|-----|---------------|---|----|-----|---------------|---|----|----|-------------------------------|---|----|-----|------------------------------------|---|----|-----|----------------|---|-----|---|---------------|----|--------|----|-------------------|---|----|-----|---------------|----|--------|----|
| Quiescent Current | 87 mA @ 12 VDC; 56 mA @ 24 VDC typical | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Protection | Reverse polarity protection Overvoltage protection up to 150 V Overvoltage (undervoltage) shutdown | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Input Grounds | 4 common input GND connections are provided. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bipolar Analog Inputs | 2 inputs (Input 1 and 2) user selectable as Bipolar or Unipolar Voltage or Current 12-bit Analog to Digital Protected against shorts to Ground or +Vsupply <u>Voltage Types:</u> Resolution: 1 mV Accuracy: +/- 1% Ranges: +/-5 V, +/-10 V, 0-5 V, or 0-10 V <u>Current Types:</u> Resolution: 1 μ A Accuracy: +/- 1% Ranges: 0-20 mA, or 4-20 mA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Analog or Digital Inputs (Voltage, Current or PWM) | Two inputs (Inputs 3 and 4) user selectable as: Voltage, Current, PWM, or Digital 12-bit Analog to Digital (voltage, current) Protected against shorts to GND or +Vsupply <u>Voltage Types:</u> 1 mV resolution, accuracy +/- 1% error Ranges: 0-5 V or 0-10 V <u>Current Types:</u> 1 μ A resolution, accuracy +/- 1% error Ranges: 0-20 mA or 4-20 mA <u>PWM Signal Frequency:</u> 1 – 10,000 Hz PWM Duty Cycle: 0 to 100% PWM Input: 0.01% resolution, accuracy +/- 1% error <u>Digital Input:</u> Active High or Active Low. Amplitude: 3.3 V to +Vsupply | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Minimum and Maximum Ratings | <table border="1"> <thead> <tr> <th>Characteristic</th> <th>Min</th> <th>Max</th> <th>Units</th> </tr> </thead> <tbody> <tr> <td>Power Supply</td> <td>8</td> <td>36</td> <td>VDC</td> </tr> <tr> <td>Voltage Input</td> <td>0</td> <td>36</td> <td>VDC</td> </tr> <tr> <td>Current Input</td> <td>0</td> <td>21</td> <td>mA</td> </tr> <tr> <td>Current Input – Voltage Level</td> <td>0</td> <td>12</td> <td>VDC</td> </tr> <tr> <td>Digital Type Input – Voltage Level</td> <td>0</td> <td>36</td> <td>VDC</td> </tr> <tr> <td>PWM Duty Cycle</td> <td>0</td> <td>100</td> <td>%</td> </tr> <tr> <td>PWM Frequency</td> <td>50</td> <td>10 000</td> <td>Hz</td> </tr> <tr> <td>PWM Voltage pk-pk</td> <td>0</td> <td>36</td> <td>VDC</td> </tr> <tr> <td>RPM Frequency</td> <td>50</td> <td>10 000</td> <td>Hz</td> </tr> </tbody> </table> | Characteristic | Min | Max | Units | Power Supply | 8 | 36 | VDC | Voltage Input | 0 | 36 | VDC | Current Input | 0 | 21 | mA | Current Input – Voltage Level | 0 | 12 | VDC | Digital Type Input – Voltage Level | 0 | 36 | VDC | PWM Duty Cycle | 0 | 100 | % | PWM Frequency | 50 | 10 000 | Hz | PWM Voltage pk-pk | 0 | 36 | VDC | RPM Frequency | 50 | 10 000 | Hz |
| Characteristic | Min | Max | Units | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power Supply | 8 | 36 | VDC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Voltage Input | 0 | 36 | VDC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Current Input | 0 | 21 | mA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Current Input – Voltage Level | 0 | 12 | VDC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Digital Type Input – Voltage Level | 0 | 36 | VDC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PWM Duty Cycle | 0 | 100 | % | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PWM Frequency | 50 | 10 000 | Hz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PWM Voltage pk-pk | 0 | 36 | VDC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RPM Frequency | 50 | 10 000 | Hz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Outputs

| | |
|---------------------------------|---|
| Outputs | <p>2 +/- 400 mA bidirectional outputs, independent user selectable as: Servo Valve Control or Proportional Current Selectable current ranges from +/- 10 mA to +/-400 mA Accuracy: +/- 1% Output voltage up to 12 V</p> <p>Full bridge output Current sensing resistor</p> <p>Overcurrent protection is provided. Short circuit protection is provided.</p> |
| Signal Outputs | <p>2 signal outputs user selectable as voltage, or current:</p> <p><u>Voltage:</u> Ranges: 0.2-5 VDC or 0.2-10 VDC Accuracy: 1%</p> <p><u>Current:</u> Ranges: 0-20 mA or 4-20 mA, Accuracy: 1%</p> <p>Short circuit protection is provided.</p> |
| Reference Voltages | <p>One 5 V, 100 mA, 1% reference voltage One 10 V, 100 mA, 1% reference voltage</p> |
| Protection for Output Terminals | <p>Fully protected against short circuit to ground and short circuit to power supply rail. Unit will fail safe in the case of a short circuit condition, self-recovering when the short is removed.</p> |

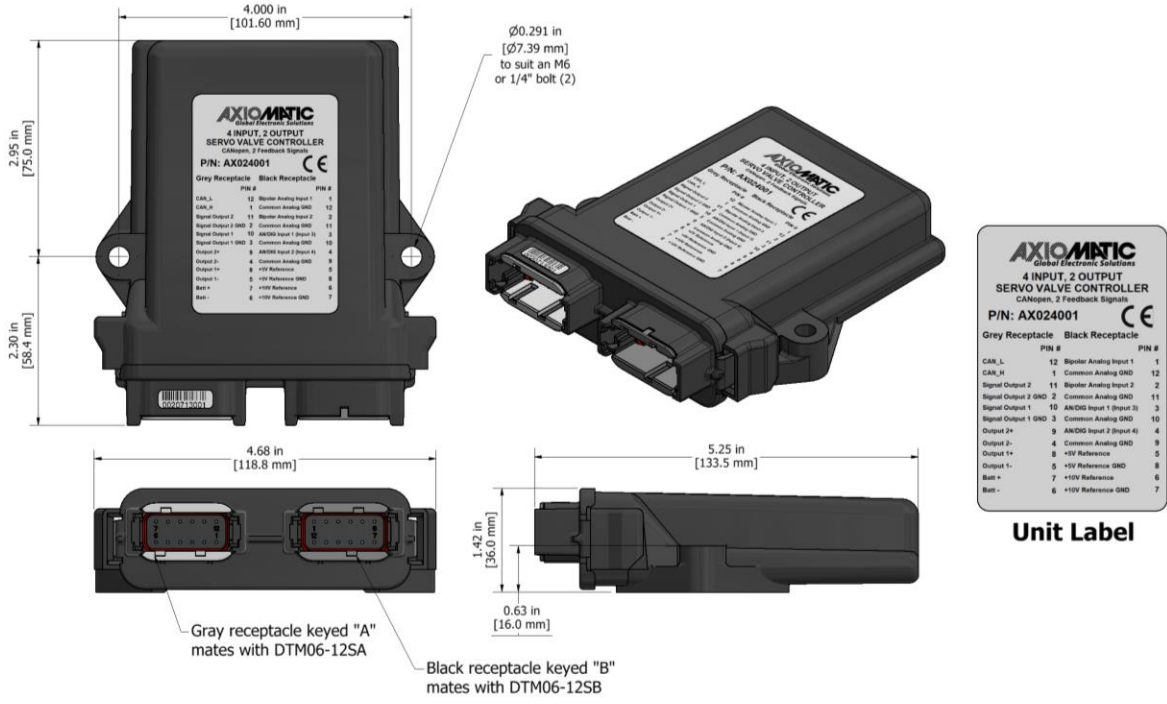
General Specifications

| | |
|--------------------------|---|
| Microcontroller | <p>STM32F205 32-bit, 1MByte flash memory</p> |
| Response Time | 70 ms for 0-400 mA current change |
| Control Logic | <p>Standard embedded firmware is provided. (Application-specific control logic or factory programmed objects on request) Refer to the User Manual for details.</p> |
| Communications | <p>1 Isolated CAN port (CANopen®) The controller is shipped with a default baud-rate of 125 kbit/s. The user can configure the device for following baud-rates: 10 kbit/s, 20 kbit/s, 50 kbit/s, 125 kbit/s, 250 kbit/s, 500 kbit/s, 800 kbit/s, and 1 Mbit/s. Please see user manual for details.</p> |
| Network Termination | <p>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.</p> |
| Compliance | CE marking |
| Vibration | <p>MIL-STD-202G, Method 204D test condition C (Sine) and Method 214A, test condition B (Random) 10 g peak (Sine); 7.68 Grms peak (Random)</p> |
| Shock | <p>MIL-STD-202G, Method 213B, test condition A 50g (half sine pulse, 9ms long, 8 per axis)</p> |
| Operating Conditions | -40 to 85 °C (-40 to 185 °F) |
| Weight | 0.55 lb. (0.25 kg) |
| Protection | IP67 |
| Enclosure and Dimensions | <p>High Temperature Nylon PCB Enclosure (equivalent TE Deutsch P/N: EEC-325X4B) 4.68 x 5.25 x 1.42 inches (118.80 x 133.50 x 36.00 mm) (W x L x H excluding mating plug) See dimensional drawing.</p> |
| Electrical Connections | <p>Refer to the pin out table below. 24-pin receptacle (equivalent TE Deutsch P/N: DTM13-12PA-12PB-R008)</p> |

| | |
|--------------|---|
| | <p style="text-align: center;">Key Arrangement B (black)</p>  <p style="text-align: center;">Key Arrangement A (grey)</p> <p>Mating plugs kits are available on request and include 1 DTM06-12SA, 1 DTM06-12SB, 2 wedgelocks (WM12S), and 24 contacts (0462-201-20141).</p> <p>20 AWG wire is recommended for use with contacts 0462-201-20141.</p> |
| Installation | <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. All field wiring should be suitable for the operating temperature range, rated voltage and current. Wiring to the product must be in accordance with all applicable local codes. Install the unit with appropriate space available for servicing and for adequate wire harness access (6 inches or 15 cm) and strain relief (12 in. or 30 cm).</p> |

| Table – Pin out | | | |
|-----------------|------------------------|-----------------|-----------------------------------|
| Grey Connector | | Black Connector | |
| PIN # | Function | PIN # | Function |
| 1 | CAN_H | 1 | Bipolar Analog Input 1 (Input 1) |
| 2 | Signal Output 2 Ground | 2 | Bipolar Analog Input 2 (Input 2) |
| 3 | Signal Output 1 Ground | 3 | Analog/ Digital Input 1 (Input 3) |
| 4 | Output 2- | 4 | Analog/ Digital Input 2 (Input 4) |
| 5 | Output 1- | 5 | +5 V Reference |
| 6 | Power - | 6 | +10 V Reference |
| 7 | Power + | 7 | +10 V Reference Ground |
| 8 | Output 1+ | 8 | +5 V Reference Ground |
| 9 | Output 2+ | 9 | Common Analog Ground |
| 10 | Signal Output 1 | 10 | Common Analog Ground |
| 11 | Signal Output 2 | 11 | Common Analog Ground |
| 12 | CAN_L | 12 | Common Analog Ground |

Dimensional Drawing



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

Form: TDAX024001-12/18/23