

TECHNICAL DATASHEET #TDAX024010  
**4 INPUTS, 2 BIDIRECTIONAL 10 - 400 mA OUTPUTS  
VALVE CONTROLLER, DIN rail mount**

Four Signal Inputs  
Two Bi-directional 10-400 mA Outputs  
One Reference Voltage  
Isolated CAN (SAE J1939)  
with Electronic Assistant®  
Developed with Simulink®  
NFC

**P/N: AX024010**

**Features:**

- Two bidirectional outputs from -400mA to +400 mA
- Isolated SAE J1939 CAN port
- Two analog signal inputs are selectable as the following voltage or current signals (Inputs 1 & 2).
  - 0-5V, 0-10V, 0 to +/- 5V, 0 to +/- 10V
  - 4-20mA, or 0-20mA
- Two analog/digital inputs are available as the following signals (Inputs 3 & 4).
  - 0-5V, 0-10V,
  - 4-20 mA, 0-20 mA,
  - PWM,
  - Frequency,
  - or Digital (Active High or Active Low).
- 12Vdc or 24Vdc nominal
- One reference voltage (+5V) is available to power sensors.
- Operates from -40 to 85°C (-40 to 185°F).
- Two LED indicators
- IP20
- DIN rail mount
- CE marking
- Configurable via Electronic Assistant®
- The firmware was developed using Simulink®.
- A Near Field Communications Antenna is provided for simple configurations (Google Play App):
  - Place the phone next to the antenna and configure while unpowered.
  - The E-Write NFC Android Application provides flexible user configurability for application-specific input-output relationship with slope or time response.
  - Protected and secure communications



**Applications:**

- servo valve control in motion control, industrial automation

**Ordering Part Numbers:**

Valve Controller, SAE J1939 (250 kbps): **AX024010**  
Valve Controller, SAE J1939 (500 kbps): **AX024010-01**  
Valve Controller, SAE J1939 (1 Mbps): **AX024010-02**

Electronic Assistant®: **AX070502**

## 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](http://www.axiomatic.com/service.html).

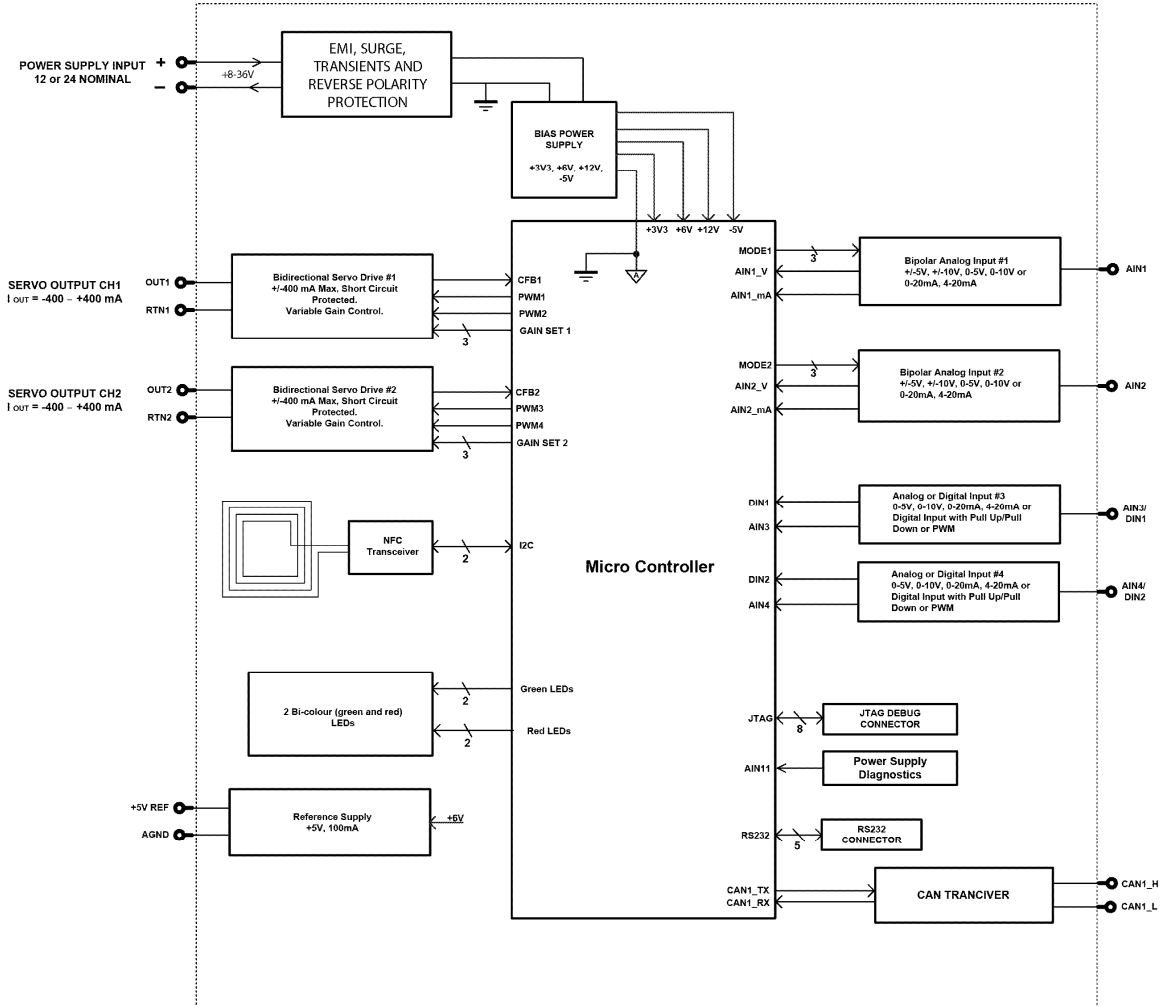


Figure 1.0 - Block Diagram

### Inputs

Power Supply Input	12V or 24Vdc nominal (9...36Vdc power supply range)
Protection	Reverse polarity protection Overvoltage protection up to 38V Under voltage shutdown at 7.5V.
Input Grounds	Three common input GND connections are provided.

Bipolar Analog Inputs	<p>Two inputs (Input 1 and 2 in Table 2.0.) User selectable as Bipolar or Unipolar Voltage or Current</p> <p>12-bit Analog to Digital Protected against shorts to GND or +Vsupply</p> <p>Voltage Types: 1mV resolution, accuracy +/- 1% error Ranges: +/-5V or +/-10V or 0-5V or 0-10V</p> <p>Current Types: 1uA resolution, accuracy +/- 1% error Ranges: 0-20mA or 4-20mA</p>																																												
Analog or Digital Inputs (Voltage, Current or PWM)	<p>Two inputs (Inputs 3 and 4 in Table 2.0.) User selectable as: Voltage, Current, PWM or Digital</p> <p>12-bit Analog to Digital (voltage, current) Protected against shorts to GND or +Vsupply</p> <p>Voltage Types: 1mV resolution, accuracy +/- 1% error Ranges: 0-5V, 0-10V</p> <p>Current Types: 1uA resolution, accuracy +/- 1% error Ranges: 0-20mA or 4-20mA</p> <p>PWM Signal Frequency: 1 – 10,000 Hz PWM Duty Cycle: 0 to 100% PWM Input: 0.01% resolution, accuracy +/- 1% error</p> <p>Digital Input: Active High or Active Low. Amplitude: 3.3V to +Vsupply</p>																																												
Minimum and Maximum Ratings	<table border="1" data-bbox="565 1045 1166 1394"> <thead> <tr> <th colspan="4"><b>Table 1.0. Absolute Maximum and Minimum Ratings</b></th> </tr> <tr> <th><b>Characteristic</b></th> <th><b>Min</b></th> <th><b>Max</b></th> <th><b>Units</b></th> </tr> </thead> <tbody> <tr> <td>Power Supply</td> <td>9</td> <td>36</td> <td>V dc</td> </tr> <tr> <td>Voltage Input</td> <td>0</td> <td>36</td> <td>V dc</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>V dc</td> </tr> <tr> <td>RPM Frequency</td> <td>50</td> <td>10 000</td> <td>Hz</td> </tr> </tbody> </table>	<b>Table 1.0. Absolute Maximum and Minimum Ratings</b>				<b>Characteristic</b>	<b>Min</b>	<b>Max</b>	<b>Units</b>	Power Supply	9	36	V dc	Voltage Input	0	36	V dc	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	V dc	RPM Frequency	50	10 000	Hz
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## Outputs

Outputs	<p>Two +/- 400 mA bidirectional outputs, independent            User selectable as:            Servo Valve Control or Proportional Current            Selectable current ranges from +/- 10mA to +/-400 mA            Accuracy: +/- 1%</p> <p>Output voltage up to +Vps</p> <p>Full bridge output            Current sensing resistor</p> <p>Overcurrent protection is provided.            Short circuit protection is provided.</p>
Reference Voltages	One 5V, 100mA, 1% reference voltage
Protection for Output Terminals	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.

## General Specifications

Microprocessor	STM32F205VGT7 32-bit, 1MByte flash memory
Typical Quiescent Current	60mA @ 12Vdc; 35mA @ 24Vdc
Response Time	70 ms for 0 to 400 mA current change.
LED Indicators	2 bicolour LED's (Red and Green) Power, heartbeat, input fault indication and output fault indication
Control Logic	Standard embedded software is provided. Setpoints are user configurable. (Application-specific control logic or factory programmed setpoints on request) Refer to the User Manual for details.
Communications	Near Field Communication Full-duplex Data rate: 106 kbit/s Complies with ISO1443 (RF protocol), ISO13239, and ISO7816 Protected and secure configuration
User Interface	E-WRITE NFC Application is available from Google Play. <a href="https://play.google.com/store?hl=en">https://play.google.com/store?hl=en</a>
Software Reflashing	Electronic Assistant® P/N: AX070502
Simulink®	Model <b>AX024010</b> was developed using Simulink®. <b>Simulink®</b> is a model-based design tool from Mathworks®.
CAN bus	1 Isolated CAN port (SAE J1939) AX024010: 250 kbps baud rate AX024010-01: 500 kbps baud rate SAE J1939 AX024010-02: 1 Mbps baud rate SAE J1939
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.
Operating Conditions	-40 to 85 °C (-40 to 185 °F)
Enclosure and Dimensions	Phoenix Contact: ME MAX 22,5 G 2-2 KMGY – 2713638 or PHO ME MAX 22.5 2-2 KMGY – 2713625 (vented) Polyamide, UL94V0, cULus recognized, China RoHS DIN rail TH 35-7.5  99 x 114.5 x 22.5 x 99 mm (L x H x W x D) Refer to Figure 2.0.
Protection	IP20
Electrical Connections	4 Phoenix Contact PSPT 2,5/ 4-ST KMGY spring clamp connectors Accepts 24-14 AWG wire. Refer to Table 2.0 and Figure 2.0. for pin out.
Compliance	CE marking
Weight	0.30 lb. (0.136 kg)
Installation	DIN rail mount TH 35-7.5

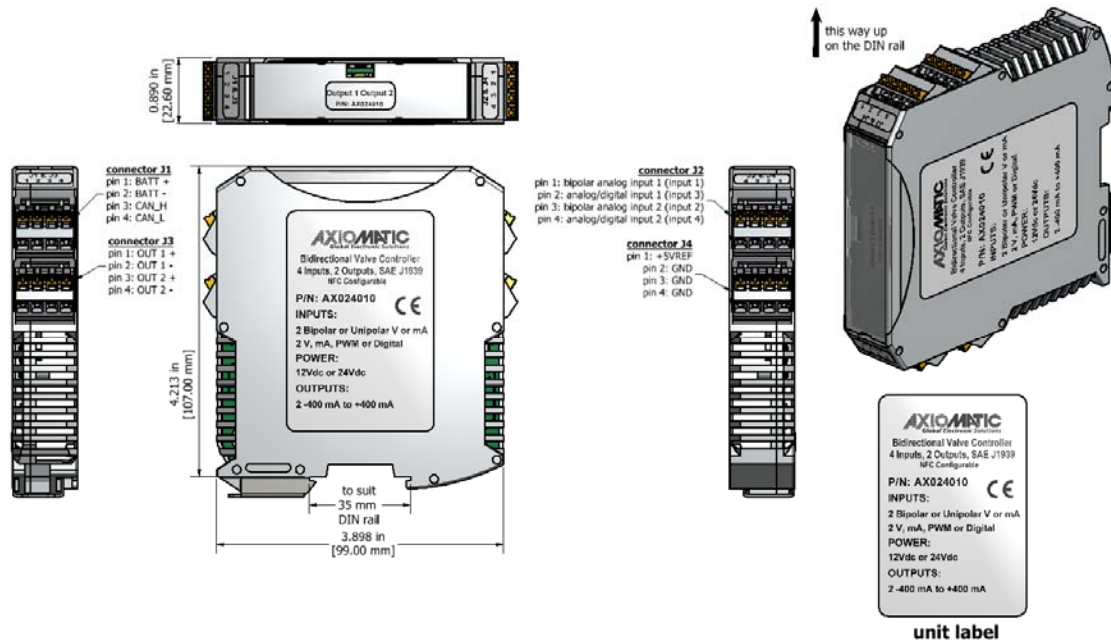


Figure 2.0 – Dimensions

Table 2.0 – Pin out: AX024010

Power and CAN (J1)		Outputs (J3)		Inputs (J2)		Reference and GNDs (J4)	
PIN #	Function	PIN #	Function	PIN #	Function	PIN #	
1	BATT +	1	Output 1+	1	Bipolar Analog Input 1 (Input 1)	1	+5V Reference
2	BATT –	2	Output 1-	2	Analog/Digital Input 1 (Input 3)	2	Common Analog GND
3	CAN_H	3	Output 2+	3	Bipolar Analog Input 2 (Input 2)	3	Common Analog GND
4	CAN_L	4	Output 2-	4	Analog/Digital Input 2 (Input 4)	4	Common Analog GND

Note: CANopen® is a registered community trade mark of CAN in Automation e.V.  
 Electronic Assistant® is a registered trademark of Axiomatic Technologies Corporation.  
 Simulink® is a registered trademark of The Mathworks, Inc.

Form: TDAX024010-09/12/18