PRELIMINARY
TECHNICAL DATASHEET #TDAX032101

2 Bipolar, 8 Universal Signal Inputs Controller

CAN (CANopen®)
Ethernet (Modbus TCP/IP)
Two +5V references
DIN rail mount

P/N: AX032101

Features:

- CANopen® port
- Ethernet port (Modbus TCP/IP)
- Two (2) signal inputs are selectable as bipolar voltage, current, digital or PWM signal types:
  - 0-5V, 0-10V, 0 to +/- 5V, 0 to +/- 10V;
  - 4-20mA, 0-20mA;
  - PWM, Frequency;
  - or Digital (Discrete Voltage Level).
- Eight (8) universal signal inputs are selectable as bipolar voltage, current, resistive, digital, PWM or frequency signal types:
  - 0-5V, 0-10V;
  - 4-20mA, 0-20mA;
  - Resistive
  - PWM;
  - Frequency;
  - or Digital.
- 12Vdc or 24Vdc nominal
- Two reference voltages (+5V) are available.
- Operates from -40 to 85°C (-40 to 185°F).
- Two LED indicators
- IP20
- DIN rail mount, screw terminal connections
- EDS File is provided.

Applications:

- industrial control panels
- power gen set engine control systems
- oil and gas equipment automation
- machine automation

Ordering Part Numbers:

2 Bipolar A/D and 8 Universal Signal Inputs Controller, Modbus TCP/IP, CANopen®: **AX032101**
2 Bipolar A/D and 8 Universal Signal Inputs Controller, CANopen®: **AX032121**

Accessories:
EDS File

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Description: The Controller accepts two analog/digital signal inputs and eight universal signal inputs. The control can be networked to a CANopen® or a Modbus TCP/IP fieldbus. Two +5V, 100 mA references are available to power sensor inputs. A rugged power supply interface accepts 12 Vdc or 24 Vdc nominal for battery powered machine applications. LED's indicate operational status. The enclosure is DIN rail mount. It operates from -40 to 85°C (-40 to 185°F). Standard embedded software is provided. The sophisticated control algorithms allow the user to program the controller for a wide range of applications without the need for custom software.

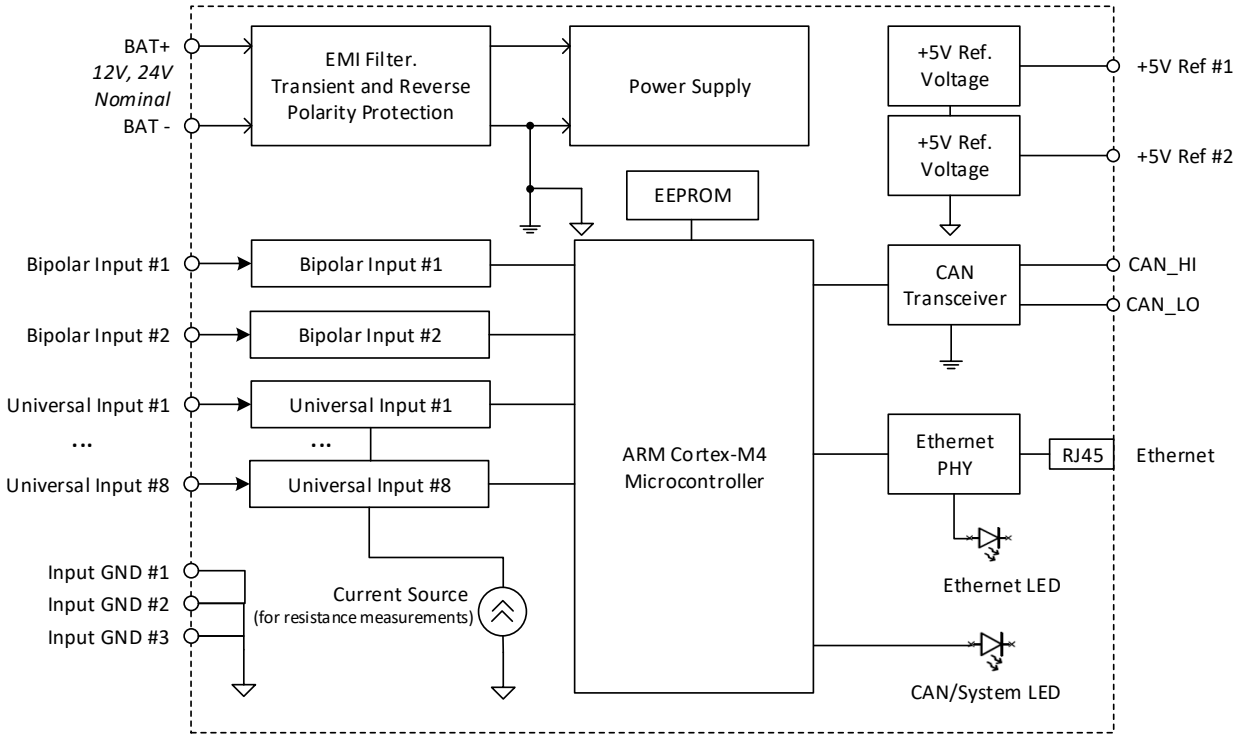

Figure 1.0 – Block Diagram

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 Vdc or 24 Vdc nominal 8…36 Vdc power supply range
Protections	Reverse polarity protection Transient protection Short circuit to Ground protection

Bipolar Inputs

Inputs	2 Bipolar Analog or Digital Signal Inputs User programmable as Bipolar or Unipolar Voltage, Current, PWM or Digital signal inputs types. Refer to Table 1.0.
Input Grounds	1 provided
Protection	All inputs are protected against short to GND. All inputs, except current inputs, are protected against shorts to Nominal Vps (36Vdc).

Table 1.0 –User Programmable Bipolar and Analog Inputs

Analog Input Functions	Voltage Input, Current Input
Voltage Input	0-5 V (Impedance 1MΩ) 0-10 V (Impedance 1MΩ) +/- 5V (Impedance 1MΩ) +/- 10V (Impedance 1MΩ)
Current Input	0-20 mA (Impedance 124 Ω) 4-20 mA (Impedance 124 Ω)
Analog Update Rate	1.67 ms depending on analog filter settings
Input Accuracy and Resolution	

Input Type	Input Range	Accuracy	Resolution
Voltage	0-5V	+/- TBD%	<1.5 mV
	0-10V	+/- TBD%	<3 mV
	-5V to 5V	+/- TBD%	<3 mV
	-10V to 10V	+/- TBD%	<6 mV
Current	0(4)-20mA	+/- TBD%	<12 µA

Digital Input Functions	Discrete Voltage Level, PWM Duty Cycle Input, Frequency Input
Input Polarity	Active High or Active Low
Input Impedance	1 M Ω Impedance – High Z, 10 kOhm pull-down, 10 kOhm pull-up to +14V
Input Level	5V CMOS compatible A direct connection to the power supply is acceptable.
Discrete Voltage Level Input	1 ms sampling rate Configurable debouncing
Frequency Input	

Input Number	Counter Resolution	Frequency Range	Resolution	Accuracy
Bipolar Input #1	32-bit	1Hz…10kHz	<0.0000012… 0.012%	<0.01%
Bipolar Input #2	16-bit	100Hz…10kHz	<0.0017… 0.17%	
		10Hz…1kHz		
		1Hz…100Hz		

PWM Input	

Input Number	Counter Resolution	Frequency Range	Resolution	Accuracy
Bipolar Input #1	32-bit	1Hz…10kHz	<0.0000012… 0.012%	TBD
Bipolar Input #2	16-bit	100Hz…10kHz	<0.0017… 0.17%	
		10Hz…1kHz		
		1Hz…100Hz		

PWM Duty Cycle	0…100% Duty Cycle
Protection	+/- 36V maximum Forward and reverse polarity protection

Universal Inputs

Inputs	8 Universal Signal Inputs User programmable as Voltage, Current, Resistive, Frequency, PWM or Digital signal inputs types. Refer to Table 2.0.

Table 2.0 –User Programmable Universal Inputs

Analog Input Functions	Voltage Input, Current Input, Resistive Input
Voltage Input	0-5 V (Impedance 1MΩ (High Z)) 0-10 V (Impedance 204 kΩ)
Current Input	0-20 mA (Impedance 249 Ω) 4-20 mA (Impedance 249 Ω)
Input Accuracy and Resolution	

Input Type	Input Range	Accuracy	Resolution
Voltage	0-5V	+/- TBD%	<1.5 mV
	0-10V	+/- TBD%	<3 mV
Current	0(4)-20mA	+/- TBD%	<12 µA

Resistive Input

Input Range	Resolution	Accuracy
Auto Range 10…250kOhm[1,2]	–	–
0…250Ohm[2]	<0.15 Ohm	TBD
0…2.5kOhm	<1.5 Ohm	TBD
0…25kOhm	<15 Ohm	TBD
0…250kOhm	<150 Ohm	TBD

[1] Resolution and accuracy depend on the automatically selected Input Range.
[2] Resistance <10 Ohm is measured as 0.

Analog Update Rate	1.67 ms depending on analog filter settings In resistive mode, it also depends on the number of resistive inputs.
Digital Input Functions	Discrete Voltage Level, PWM Duty Cycle Input, Frequency Input
Input Polarity	Active High or Active Low
Input Impedance	1 M Ω Impedance – High Z, 10 kOhm pull-down, 10 kOhm pull-up to +14V
Input Level	5V CMOS compatible A direct connection to the power supply is acceptable.
Discrete Voltage Level Input	1 ms sampling rate Configurable debouncing
Frequency Input	

Input Number	Counter Resolution	Frequency Range	Resolution	Accuracy
Universal Input #1-8	16-bit	100Hz…10kHz	<0.0017… 0.17%	<0.01%
		10Hz…1kHz		
		1Hz…100Hz		

PWM Input

Input Number	Counter Resolution	Frequency Range	Resolution	Accuracy
Universal Input #1-8	16-bit	100Hz…10kHz	<0.0017… 0.17%	TBD
		10Hz…1kHz		
		1Hz…100Hz		

PWM Duty Cycle	0…100% Duty Cycle
Protection	+/- 36V maximum Forward and reverse polarity protection

Outputs

Voltage References	Two +5V, +/- 1%, 100 mA Short circuit protection Connection to the power supply is prohibited.

General Specifications

<table>
<tr><td>Microcontroller</td><td>STM32F407Z, 32-bit, 1MByte flash memory</td></tr>
<tr><td>Typical Quiescent Current</td><td>100 mA@ 12Vdc; 50 mA @ 24Vdc typical</td></tr>
<tr><td>LED Indicators</td><td>2 bicolour LED’s

Red/Green: CAN/System error/CAN link (activity)
Flashing: Bootloader mode

Yellow/Green: Ethernet speed/link (activity)</td></tr>
<tr><td>CAN Communications</td><td>1 CAN port (CANopen®)</td></tr>
<tr><td>Ethernet</td><td>One 10 BASE-T/100 BASE-TX Ethernet port
Auto-MDIX
Ethernet IEEE 802.3, IP, ICMP, ARP, UDP, TCP, Modbus TCP, Proprietary Discovery Protocol</td></tr>
<tr><td>Modbus TCP/IP</td><td>Uses Ethernet port
Server mode (slave device)
Up to 8 simultaneous connections

<table><tr><td colspan="2">Supported function codes:</td></tr><tr><td>2, 4</td><td>Reading bipolar/Universal inputs</td></tr><tr><td>3, 6, 13, 23</td><td>Reading/changing configuration parameters</td></tr><tr><td>43/14</td><td>Reading controller ID, S/N on a private object 0x80</td></tr></table></td></tr>
<tr><td>Control Logic</td><td>Refer to the user manual.</td></tr>
<tr><td>User Interface</td><td>EDS File
CANopen® tools (not supplied)
Refer to the user manual for details.

Modbus TCP - Third-party software</td></tr>
<tr><td>Software Reflashing</td><td>Via J1939 CAN – Axiomatic Electronic Assistant KIT, P/Ns: AX070502, AX070505K, or AX070506K
Modbus TCP – not currently supported</td></tr>
<tr><td>Operating Conditions</td><td>-40 to 85 °C (-40 to 185 °F)</td></tr>
<tr><td>Storage Temperature</td><td>-55 to 125 °C (-67 to 257°F)</td></tr>
<tr><td>Protection</td><td>IP20</td></tr>
<tr><td>Weight</td><td>0.30 lb. (0.136 kg)</td></tr>
<tr><td>Enclosure and Dimensions</td><td>Phoenix Contact: ME MAX 22,5 G 2-2 KMGY – 2713638
Polyamide, UL94V0, cULus recognized, China RoHS
DIN rail TH 35-7.5

114.5 x 22.5 x 99 x 107 mm
4.508 x 0.89 x 3.898 x 4.213 in (L x H x W x D)
Refer to Figure 2.0.</td></tr>
<tr><td>Electrical Connections</td><td>4 sets of 5 Phoenix Contact MC 1,5/ 5-ST-3,5 GY7035 3.5 mm screw terminal connectors
Accepts 28-16 AWG wire.
RJ-45 for Ethernet connection
Refer to Table 3.0 and Figure 2.0. for pin out.</td></tr>
<tr><td>Installation</td><td>DIN rail mount
TH 35-7.5 or TH 35-15 (mm)</td></tr>
<tr><td>Network Termination</td><td>ISO 11898
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. Baud rate up to 1 Mbit/s is supported.</td></tr>
</table>

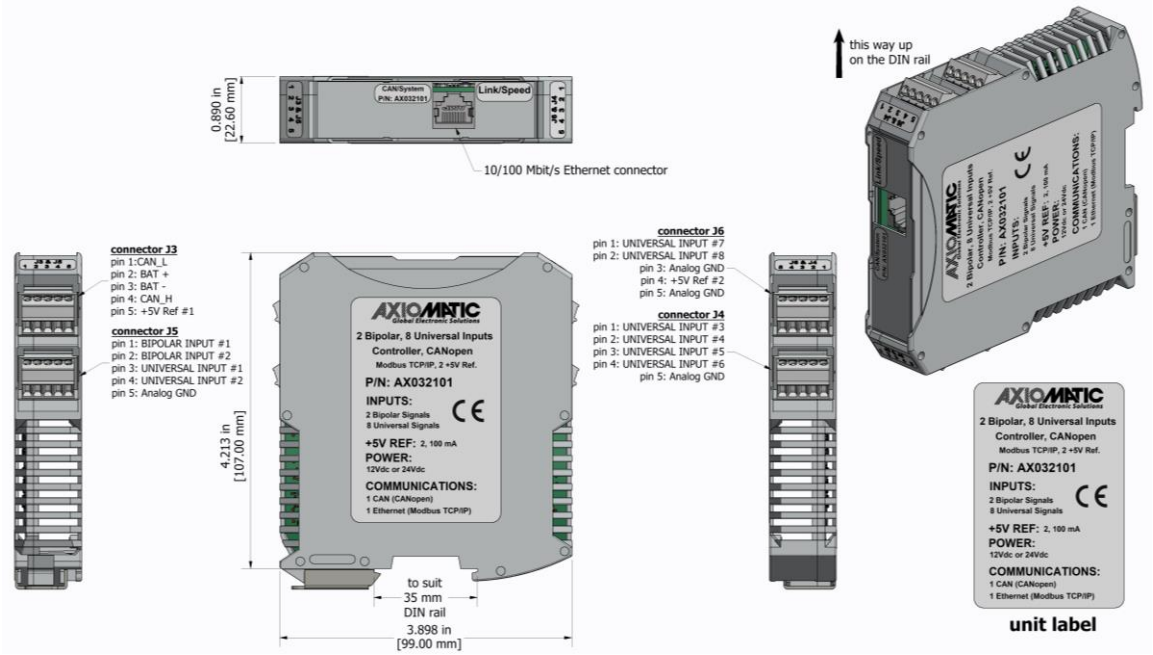

Figure 2.0 – Dimensional drawing for AX032101

Figure 3.0 Dimensions – AX032121

Table 3.0 – Pin out: AX032101

Power and CAN (J3)		Bipolar Inputs 1-2, Universal Inputs 1-2 (J5)		Universal Inputs 7-8 (J6)		Universal Inputs 3-6 (J4)	
PIN #	Function	PIN #	Function	PIN #	Function	PIN #	
1	CAN_L	1	Bipolar Analog/Signal Input 1	1	Universal Input 7	1	Universal Input 3
2	BATT +	2	Bipolar Analog/Signal Input 2	2	Universal Input 8	2	Universal Input 4
3	BATT –	3	Universal Input 1	3	Input GND	3	Universal Input 5
4	CAN_H	4	Universal Input 2	4	+5V Reference 2	4	Universal Input 6
5	+5V Reference 1		Input GND	5	Input GND	5	Input GND

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Form: TDAX032101-07/13/23