

7 Universal Signal, 3 RTD Inputs, 2 Digital Outputs Controller

CAN (SAE J1939)

Ethernet (Modbus TCP/IP) in Model AX180000 only

P/N: AX180000, AX180010

Features:

- SAE J1939 CAN port with auto-baud-rate detection
- Ethernet port (Modbus TCP/IP) (Model AX180000)
- Seven (7) 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.
- 3 PT100 Inputs
- 2 Digital Outputs (1 A)
- 12Vdc or 24Vdc nominal
- Operates from -40 to 85°C (-40 to 185°F).
- Two LED indicators
- IP20
- DIN rail mount, screw terminal connections
- Configurable via the Axiomatic Electronic Assistant or Web Server (Model AX180000)



Applications:

- Industrial Control Panels
- Power Gen Set Engine Control Systems
- Oil and Gas Equipment Automation
- Machine Automation

Ordering Part Numbers:

7 Universal Signal, 3 RTD Inputs, 2 Digital Outputs Controller, Modbus TCP/IP, SAE J1939 auto-baud-rate detection: **AX180000**

7 Universal Signal, 3 RTD Inputs, 2 Digital Outputs Controller, SAE J1939 auto-baud-rate detection: **AX180010**

Accessories:

Axiomatic Electronic Assistant Configuration KIT, P/Ns: **AX070502**, **AX070505K**, or **AX070506K**

Description: The Controller accepts seven universal signal inputs. The control can be networked to a SAE J1939 or a Modbus TCP/IP fieldbus (in Model AX180000). 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 and is configurable using the Axiomatic Electronic Assistant (EA). The sophisticated control algorithms allow the user to program the controller for a wide range of applications without the need for custom software.

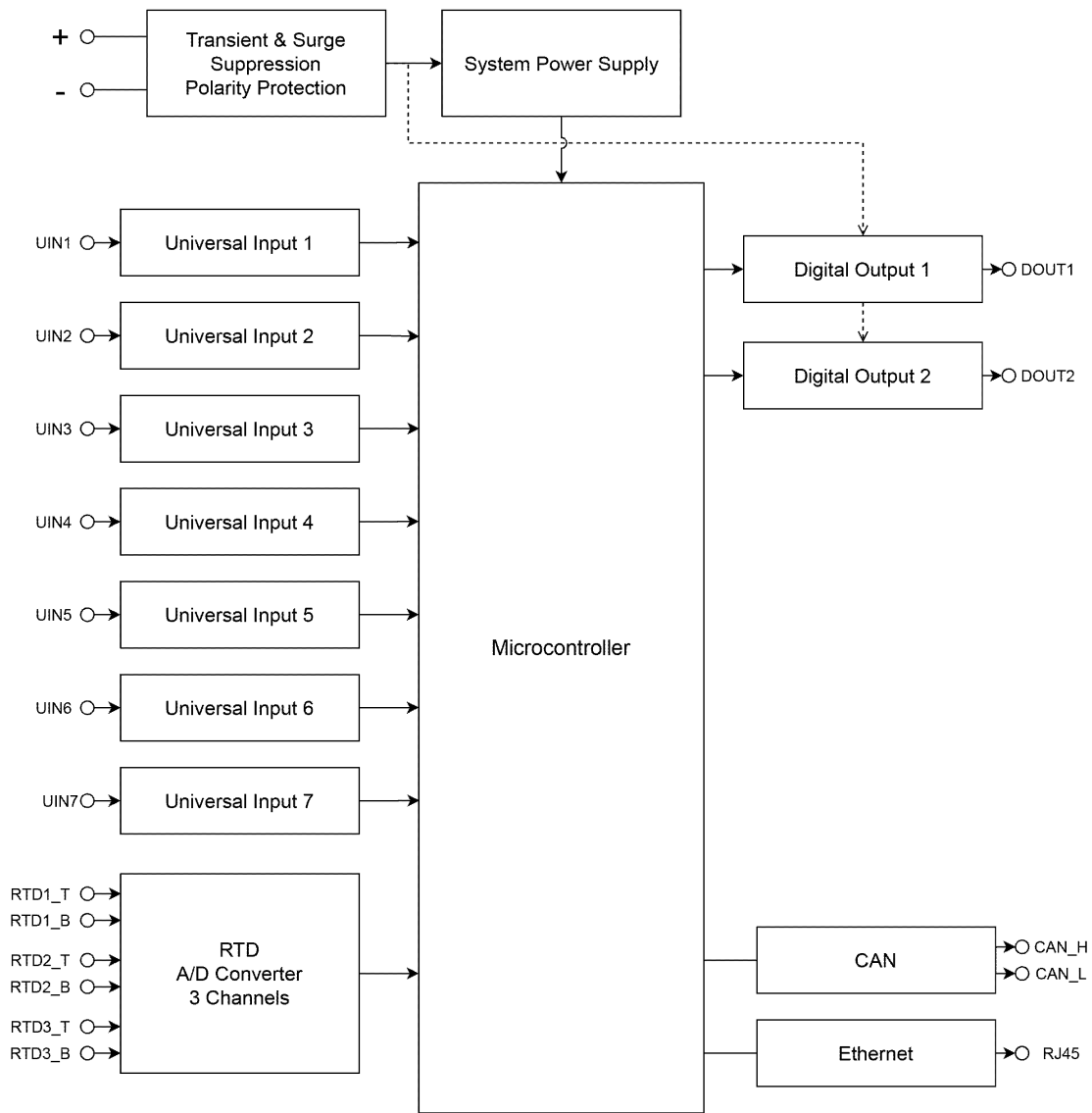


Figure 1.0 – Block Diagram

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 or 24 Vdc nominal (8...36 Vdc)
Protections	Reverse polarity protection Transient protection Short circuit to Ground protection

Inputs

Signal Inputs	7 Universal Signal Inputs User programmable as Voltage, Current, Resistive, Frequency, PWM or Digital signal input types. Refer to Table 1.0.																				
RTD Inputs	3 Channels, 2-Wire, Pt100																				
Table 1.0 –User Programmable Universal Inputs																					
Analog Input Functions	Voltage Input, Current Input, Resistive Input																				
Voltage Input	0-5 V (Impedance 1M Ω (High Z)) 0-10 V (Impedance 204 k Ω)																				
Current Input	0-20 mA (Impedance 249 Ω) 4-20 mA (Impedance 249 Ω)																				
Input Accuracy and Resolution	<table border="1"> <thead> <tr> <th>Input Type</th> <th>Input Range</th> <th>Accuracy</th> <th>Resolution</th> </tr> </thead> <tbody> <tr> <td>Voltage</td> <td>0-5V</td> <td>+/- TBD%</td> <td><1.5 mV</td> </tr> <tr> <td></td> <td>0-10V</td> <td>+/- TBD%</td> <td><3 mV</td> </tr> <tr> <td>Current</td> <td>0(4)-20mA</td> <td>+/- TBD%</td> <td><12 μA</td> </tr> </tbody> </table>					Input Type	Input Range	Accuracy	Resolution	Voltage	0-5V	+/- TBD%	<1.5 mV		0-10V	+/- TBD%	<3 mV	Current	0(4)-20mA	+/- TBD%	<12 μ A
Input Type	Input Range	Accuracy	Resolution																		
Voltage	0-5V	+/- TBD%	<1.5 mV																		
	0-10V	+/- TBD%	<3 mV																		
Current	0(4)-20mA	+/- TBD%	<12 μ A																		
Resistive Input	<table border="1"> <thead> <tr> <th>Input Range</th> <th>Resolution</th> </tr> </thead> <tbody> <tr> <td>Auto Range 10...250kOhm^{1,2}</td> <td>–</td> </tr> <tr> <td>0...250Ohm²</td> <td><0.15 Ohm</td> </tr> <tr> <td>0...2.5kOhm</td> <td><1.5 Ohm</td> </tr> <tr> <td>0...25kOhm</td> <td><15 Ohm</td> </tr> <tr> <td>0...250kOhm</td> <td><150 Ohm</td> </tr> </tbody> </table> <p>¹ Resolution and accuracy depend on the automatically selected Input Range. ² Resistance <10 Ohm is measured as 0.</p>					Input Range	Resolution	Auto Range 10...250kOhm ^{1,2}	–	0...250Ohm ²	<0.15 Ohm	0...2.5kOhm	<1.5 Ohm	0...25kOhm	<15 Ohm	0...250kOhm	<150 Ohm				
Input Range	Resolution																				
Auto Range 10...250kOhm ^{1,2}	–																				
0...250Ohm ²	<0.15 Ohm																				
0...2.5kOhm	<1.5 Ohm																				
0...25kOhm	<15 Ohm																				
0...250kOhm	<150 Ohm																				
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	<table border="1"> <thead> <tr> <th>Input Number</th> <th>Counter Resolution</th> <th>Frequency Range</th> <th>Resolution</th> <th>Accuracy</th> </tr> </thead> <tbody> <tr> <td rowspan="3">Universal Input #1-7</td> <td rowspan="3">16-bit</td> <td>100Hz...10kHz</td> <td><0.0017...</td> <td rowspan="3"><0.01%</td> </tr> <tr> <td>10Hz...1kHz</td> <td>0.17%</td> </tr> <tr> <td>1Hz...100Hz</td> <td></td> </tr> </tbody> </table>					Input Number	Counter Resolution	Frequency Range	Resolution	Accuracy	Universal Input #1-7	16-bit	100Hz...10kHz	<0.0017...	<0.01%	10Hz...1kHz	0.17%	1Hz...100Hz			
Input Number	Counter Resolution	Frequency Range	Resolution	Accuracy																	
Universal Input #1-7	16-bit	100Hz...10kHz	<0.0017...	<0.01%																	
		10Hz...1kHz	0.17%																		
		1Hz...100Hz																			
PWM Input	<table border="1"> <thead> <tr> <th>Input Number</th> <th>Counter Resolution</th> <th>Frequency Range</th> <th>Resolution</th> </tr> </thead> <tbody> <tr> <td rowspan="3">Universal Input #1-7</td> <td rowspan="3">16-bit</td> <td>100Hz...10kHz</td> <td><0.0017...</td> </tr> <tr> <td>10Hz...1kHz</td> <td>0.17%</td> </tr> <tr> <td>1Hz...100Hz</td> <td></td> </tr> </tbody> </table>					Input Number	Counter Resolution	Frequency Range	Resolution	Universal Input #1-7	16-bit	100Hz...10kHz	<0.0017...	10Hz...1kHz	0.17%	1Hz...100Hz					
Input Number	Counter Resolution	Frequency Range	Resolution																		
Universal Input #1-7	16-bit	100Hz...10kHz	<0.0017...																		
		10Hz...1kHz	0.17%																		
		1Hz...100Hz																			
PWM Duty Cycle	0...100% Duty Cycle																				
Protection	+36V maximum. Forward voltage only. No reverse polarity protection.																				

Outputs

Digital Outputs	2 Channel Type: Hot Shot, ON/OFF, PWM High Side Sourcing from BATT+, Low Side Sinking to BATT- 1 A Current Limit
-----------------	---

General Specifications

Microprocessor	STM32F407Z, 32-bit, 1MByte flash memory								
Typical Quiescent Current	30mA @ 24 Vdc, typical 45mA @ 12 Vdc, typical								
LED Indicators	2 bicolour LED's Red/Green Flashing: Bootloader Mode Red: CAN/System Error Green Flashing: CAN Link (Activity)								
CAN Communications	1 CAN port (SAE J1939) Full support for SAE J1939 ECU User-configurable PGN's Baud rate: 250, 500, 667 kbit/s, 1 Mbit/s. Automatic baud rate detection.								
Ethernet	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								
Modbus TCP/IP	Model AX180000: Uses Ethernet port Server mode (slave device) Up to 8 simultaneous connections <table border="1"> <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> Model AX180010: Not present	Supported function codes:		2, 4	Reading bipolar/Universal inputs	3, 6, 13, 23	Reading/changing configuration parameters	43/14	Reading controller ID, S/N on a private object 0x80
Supported function codes:									
2, 4	Reading bipolar/Universal inputs								
3, 6, 13, 23	Reading/changing configuration parameters								
43/14	Reading controller ID, S/N on a private object 0x80								
Control Logic	Refer to the user manual.								
User Interface – via CAN	To configure the controller for sophisticated control applications, the controller setpoints can be viewed and programmed using the standard J1939 memory access protocol through the CAN port and the PC-based Axiomatic Electronic Assistant. The Axiomatic EA can store all setpoints in one setpoint file and then flash them into the unit in one operation. The setpoint file is created and stored on disk using a command <i>Save Setpoint File</i> from the Axiomatic EA menu or toolbar. The user then can open the setpoint file, view or print it and flash the setpoint file into the unit. The Axiomatic Electronic Assistant KIT, P/Ns: AX070502 , AX070505K , or AX070506K for <i>Windows</i> operating systems comes with a royalty-free license for use on multiple computers. It includes an Axiomatic USB-CAN converter to link the device's CAN port to a <i>Windows</i> -based PC. Refer to the user manual for details.								
User Interface – via Modbus	Modbus TCP - Third-party software								
Software Reflashing	Via J1939 CAN – Axiomatic Electronic Assistant KIT, P/Ns: AX070502, AX070505K, or AX070506K. Modbus TCP – firmware update using web browser								
Operating Conditions	-40 to 85 °C (-40 to 185 °F)								
Storage Temperature	-55 to 125 °C (-67 to 257°F)								
Protection	IP20								
Weight	0.25 lb. (0.113 kg)								
Enclosure and Dimensions	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.								
Electrical Connections	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 2.0 and Figure 2.0 and 3.0 for pin out.								
Installation	DIN rail mount TH 35-7.5 or TH 35-15 (mm)								

Network Termination	<p>ISO 11898</p> <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. Baud rate up to 1 Mbit/s is supported.</p>
---------------------	---

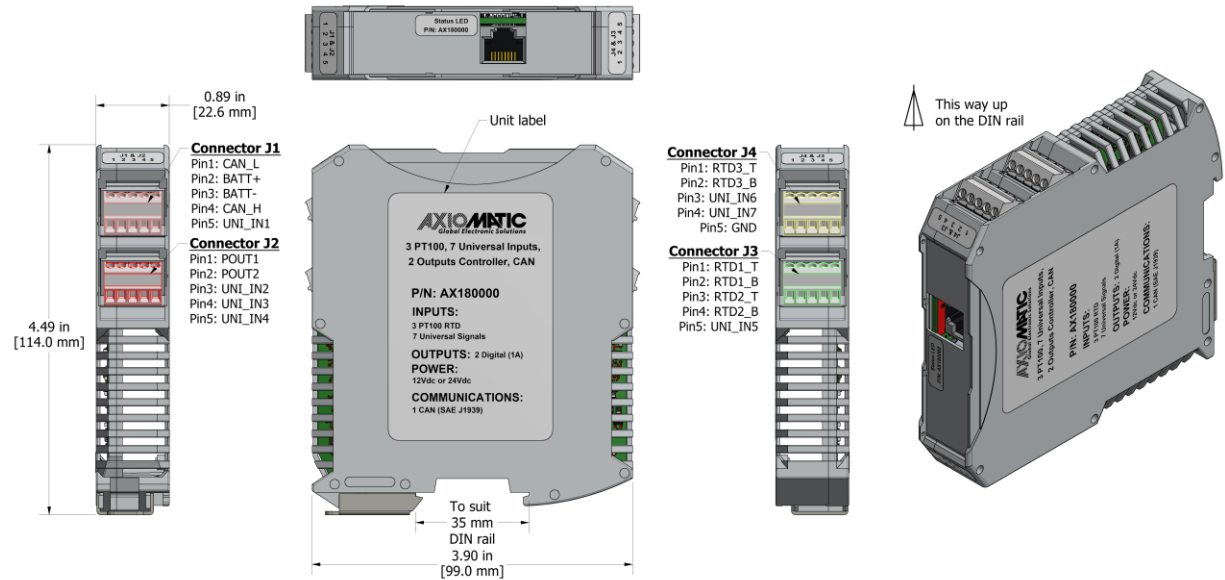


Figure 2.0 – Dimensions of AX180000 (with Ethernet)

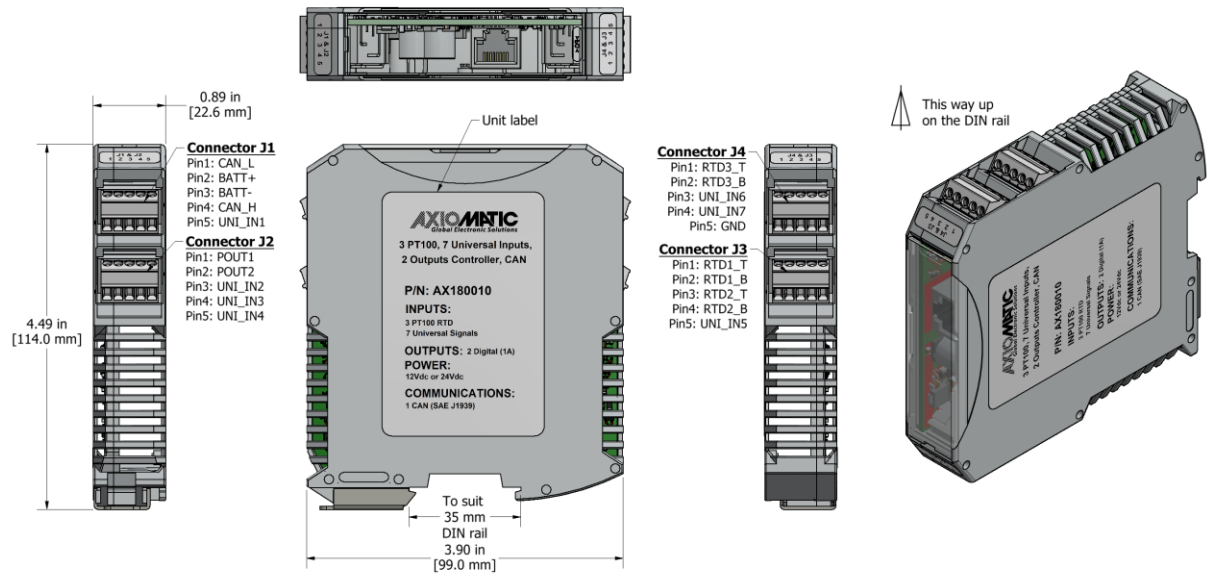


Figure 3.0 – Dimensions of AX180010

Table 2.0 – Pin out: AX1800X0

J1		J2		J3		J4		J7			
PIN #	Function	PIN #	Function	PIN #	Function	PIN #	Function	PIN #	Function		
1	CAN_L	1	Digital Output 1	1	RTD1_T	1	RTD3_T	1	TX_P	6	RX_N
2	BATT +	2	Digital Output 2	2	RTD1_B	2	Universal Input 4	2	TX_N	7	NC
3	BATT –	3	Universal Input 2	3	RTD2_T	3	Universal Input 5	3	RX_P	8	NC
4	CAN_H	4	Universal Input 3	4	RTD_B	4	Universal Input 6	4	NC		
5	Universal Input 1	5	Universal Input 4	5	Universal Input 5	5	Input GND	5	NC		

Form: TDAX1800X0-06/19/23