

*Distributed I/O for Engine Control Systems*

The Analog Signal Output CAN Controller belongs to a family of Axiomatic user-customizable smart controllers. The programmable internal architecture provides users with an ultimate flexibility, allowing them to build their own custom controller with a required functionality from a set of predefined internal functional blocks using any commercially available CANopen® tools.

**Features:**

- 1 analog signal output (voltage or current)
- User selectable output range from +/-10V or +/-20 mA, including: 0-5V; 0-10V; +/-5V; +/-10V; 0-20mA; and 4-20 mA.
- Embedded output voltage and current monitoring
- 12V/24V/48VDC input power (nominal) with rugged surge protection
- 1 CAN port (CANopen®)
- Rugged enclosure and connectors
- User programmable functionality
- .EDS provided for interfacing with standard CANopen® tools



**Applications:**

- Distributed controls for power generation, co-generation, stationary power
- Distributed controls for commercial vehicles, off-highway equipment, industrial equipment, etc.

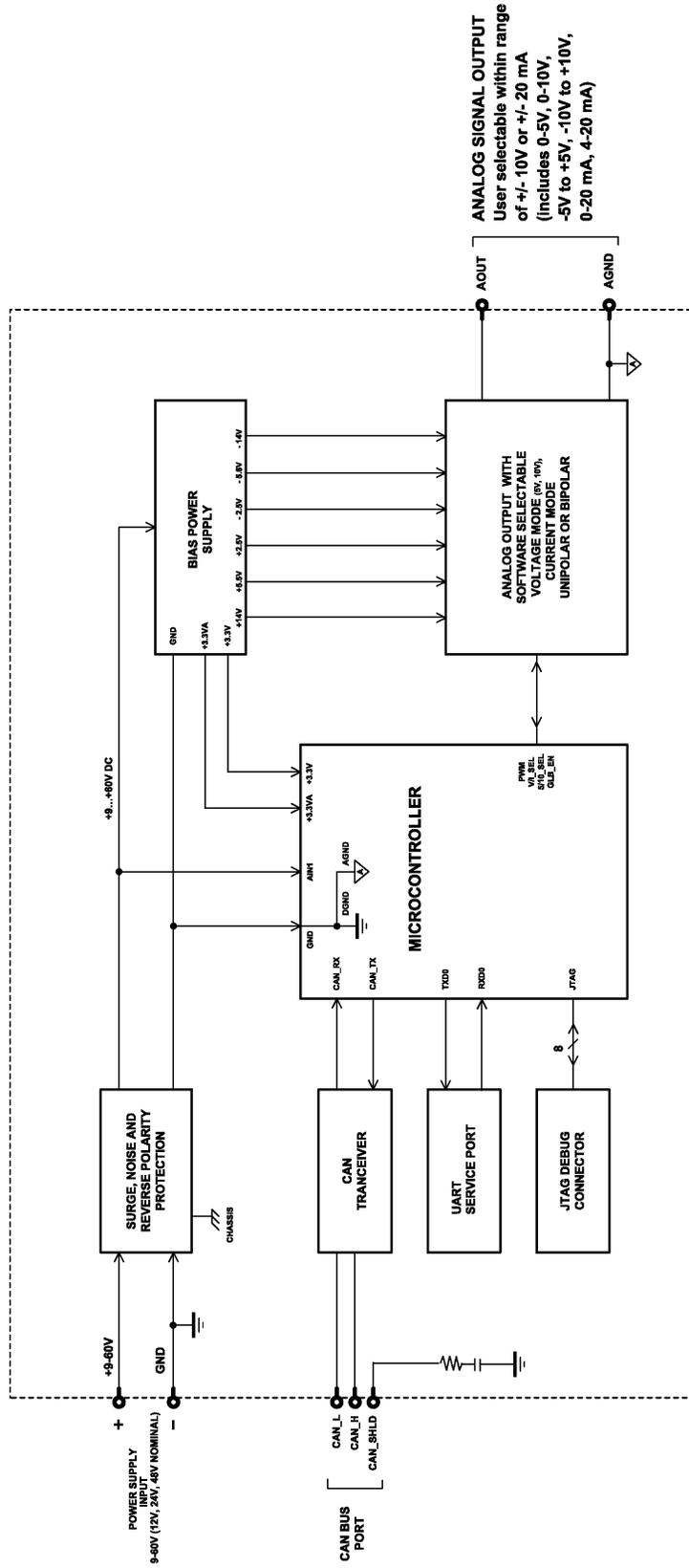
**Ordering Part Numbers:**

CANopen® Controller: **AX030521**

EDS File, UMAX030521: **Download from [www.axiomatic.com](http://www.axiomatic.com) under the log-in tab.**

Mating Plug Kit: **AX070112** (Comprised of DT06-8SA, W8S, 7 pcs. 0462-201-16141, 1 pc. 114017)

# 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/>.

## Input Specifications

Power Supply Input - Nominal	12V, 24V or 48VDC nominal (9...60 VDC power supply range)
Protection	Surge and reverse polarity protection are provided.
Input	CANopen® {SAE J1939 model is available as p/n AX030520.}

## Output Specifications

CAN	CANopen® {SAE J1939 model is available as p/n AX030520.}
Analog Outputs	1 analog signal output Refer to Table 1.0.
Ground Connection	1 Analog GND connection is provided.
Protection for Output + Terminal	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.

Table 1.0 - Outputs	
Analog Output	1 analog signal output with embedded voltage and current monitoring circuits Using the Axiomatic Electronic Assistant, the user selects: <ul style="list-style-type: none"><li>the output mode (voltage or current);</li><li>and the minimum and maximum values for the output signal from the +/-10V or +/-20 mA range.</li></ul> Standard analog signal ranges are supported, including: 0-5V; 0-10V; +/-5V; +/-10V; 0-20mA; and 4-20 mA.  The output can be globally enabled or disabled.
Output Accuracy	0.5% @ +/- 5V, +/- 10V, +/- 20 mA For all other output ranges an absolute accuracy is defined by one of the above ranges within which the output range is located. For example, for 0-5V range, the absolute accuracy is the same as for the +/- 5V range. For 0...6V range, it will be defined by the +/- 10V range.
Output Resolution	0.015% (>12 bit)
Voltage Monitoring Range	+/- 12 V
Current Monitoring Range	+/- 25 mA Voltage on the load should be within the range of +/- 8 V.
Voltage and Current Monitoring Accuracy	≤ 1% for voltage monitoring ≤ 2% for current monitoring

## Control Logic

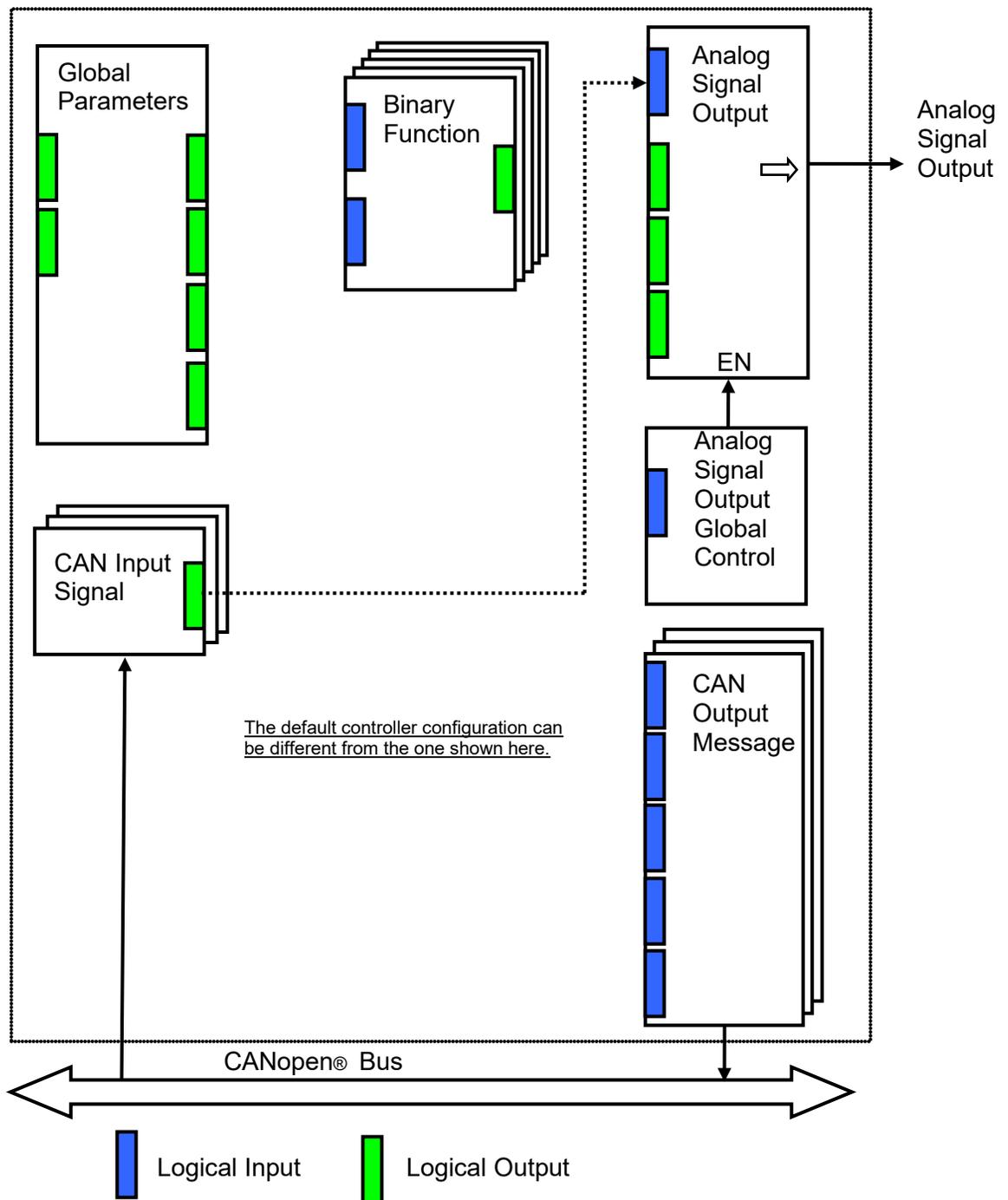
From the software prospective, the controller consists of a set of internal functional blocks, which can be individually programmed and arbitrarily connected together to achieve the required system functionality.

Each functional block is absolutely independent and has its own set of programmable parameters, or object dictionary entries. An EDS file is provided to interface to standard CANopen® tools.

There are two types of the controller functional blocks. One type represents the controller hardware resources, for example the analog signal output block. The other type is purely logical – these functional blocks are included to program the user defined functionality of the controller. The number and functional diversity of these functional blocks are only limited by the system resources of the internal microcontroller. They can be added or modified on the customer's request to accommodate user-specific requirements.

The user can build virtually any type of a custom control by logically connecting inputs and outputs of the functional blocks. This approach gives the user an absolute freedom of customization and an ability to fully utilize the controller hardware resources in a user's application. Refer to Figure 1.0.

Refer to the User Manual for more details.



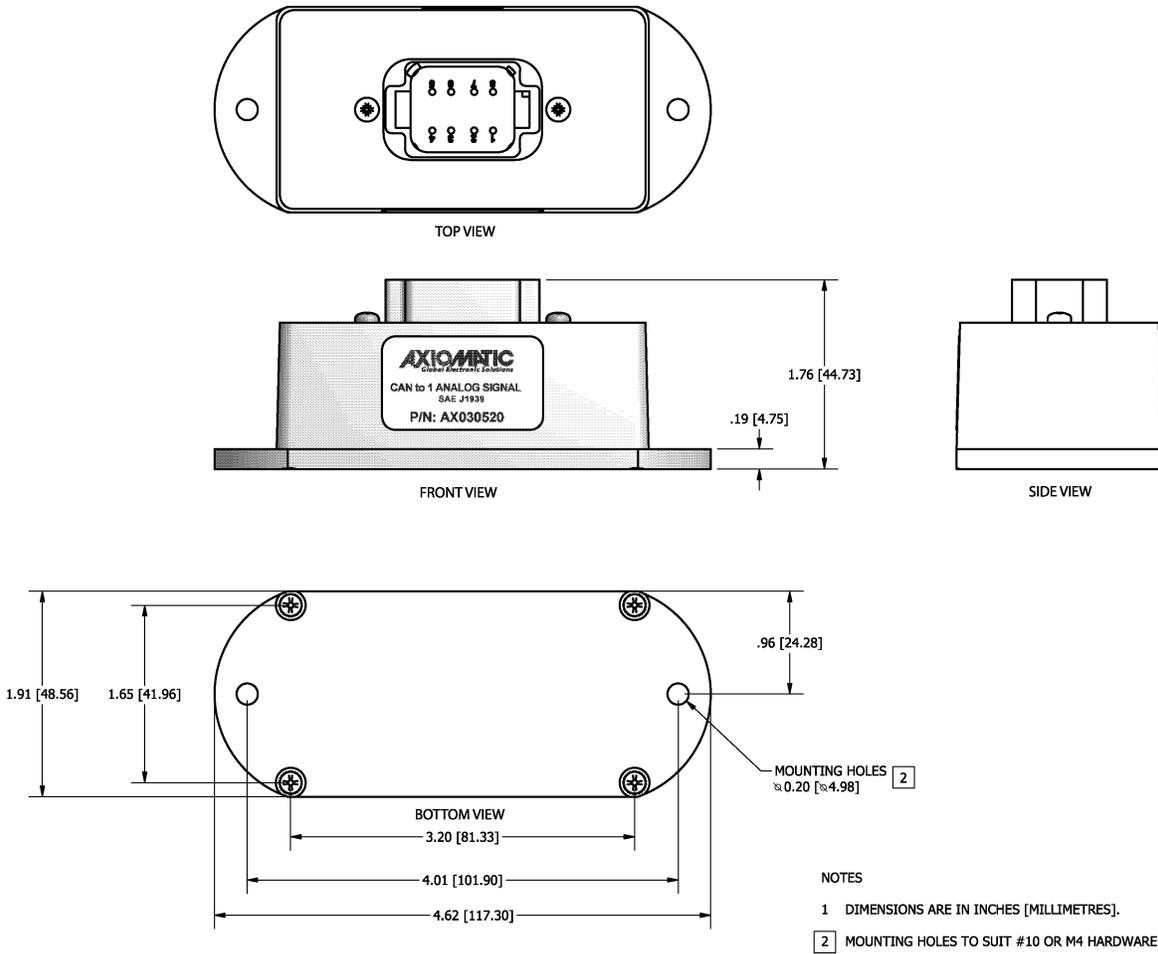
As an example, the logical output of the CAN Input Signal functional block is connected to the logical input of the Analog Signal Output functional block, providing a direct path for the CAN input signal to the controller signal output.

**Figure 1. The Controller Internal Structure.**

## General Specifications

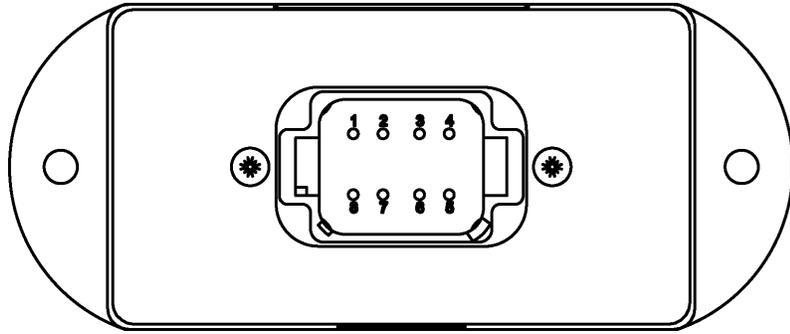
Microcontroller	32-bit, 128 KByte flash program memory						
Control Logic	Standard embedded software is provided. Refer to Figure 1.0. (Application-specific control logic or factory programmed setpoints are available on request.)						
CAN	<p>1 CAN port (CANopen®)</p> <p>The controller's object dictionary 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.</p> <p>The Axiomatic AX030521 is compliant with the following CAN in Automation (CiA) standards.</p> <table border="1"> <tr> <td>[DS-301]</td> <td>CiA DS-301 V4.02 – CANopen® Application Layer and Communication Profile. CAN in Automation 2002</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>	[DS-301]	CiA DS-301 V4.02 – CANopen® Application Layer and Communication Profile. CAN in Automation 2002	[DS-404]	CiA DS-404 V1.2 – Device Profile for Measurement Devices and Closed-Loop Controllers. CAN in Automation 2002	[DS-305]	CiA DS-305 V2.0 – Layer Setting Service (LSS) and Protocols. CAN in Automation 2006
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[DS-404]	CiA DS-404 V1.2 – Device Profile for Measurement Devices and Closed-Loop Controllers. CAN in Automation 2002						
[DS-305]	CiA DS-305 V2.0 – Layer Setting Service (LSS) and Protocols. CAN in Automation 2006						
Slew Rate	To adjust the controller to the CAN physical network, the slew rate can be configured as fast or slow. Refer to the User Manual for details.						
Monitoring and Debugging	Besides reading application signals transmitted on the CAN bus, the controller can also transmit a CAN application message carrying signals internally generated by the controller. This feature can be used for monitoring and debugging purposes.						
User Interface	<p>EDS File is provided.</p> <p>The controller architecture consists of a set of internal functional blocks, which can be individually programmed and arbitrarily connected together to achieve the required system functionality for a specific application. All objects are user configurable using standard commercially available tools that can interact with a CANopen® Object Dictionary via an .EDS file.</p>						
Typical Quiescent Current Draw	54 mA @ 12VDC, 29 mA @ 24VDC; 17 mA @ 48VDC						
Settling Time	≤ 5 mSec. (0...95%)						
Weight	0.65 lbs. (0.29 kg)						
Operating Temperature	-40 to 85 °C (-40 to 185 °F)						
Storage Temperature	-55 to 125 °C (-67 to 257°F)						
Protection	IP67 PCB is conformal coated and protected by the enclosure.						
Enclosure and Dimensions	<p>Encapsulated</p> <p>Cast Aluminum enclosure with mounting holes</p> <p>4.62 x 1.91 x 1.76 inches (117.30 x 48.56 x 44.73 mm)</p> <p>L x W x H including integral connector</p>						

## DIMENSIONAL DRAWING



<p>Mounting</p>	<p>Mounting holes – The controller accepts 2 #10 or M4 screws.</p> <p>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.</p> <p>All field wiring should be suitable for the operating temperature range.</p> <p>Install the unit with appropriate space available for servicing and for adequate wire harness access (6 inches or 15 cm) and strain relief (12 inches or 30 cm).</p>
<p>Network Termination</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.</p>

Electrical Connections



8-pin plug (equivalent TE Deutsch P/N: DT15-08PA)

Mating plug KIT: Axiomatic P/N AX070112  
(Equivalent to the following TE Esch P/Ns: DT06-08SA socket, wedge W8S, 7 solid contact sockets 0462-201-16141 and 1 sealing plug 114017.)

16-18 AWG wire is recommended for use with sockets 0462-201-16141.

**Use dielectric grease on the pins when installing the controller.**

Wiring to these mating plugs must be in accordance with all applicable local codes. Suitable field wiring for the rated voltage and current must be used. The rating of the connecting cables must be at least 70°C. Use field wiring suitable for both minimum and maximum ambient temperature.

PIN #	FUNCTION
1	POWER +
8	POWER -
2	NOT USED
7	CAN SHIELD
3	ANALOG SIGNAL OUTPUT
6	CAN_L
4	AGND
5	CAN_H

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

Form: TDAX030521-05/31/23