10 Universal Signal Input CAN Controller
P/N: AX030101
CANopen®

10 Analog/Digital/PWM/Hz Signal Inputs and CAN bus permits connection to an HMI or networking of several devices for machine control applications in harsh environments.

- 10 user selectable inputs
  (0-5V, 0-20 mA, 4-20 mA, PWM, frequency or counter, digital)
- 12V, 24 Vdc (nominal) power input accepted
- Standard control logic
- 1 CAN port (CANopen®)
- Rugged IP67 packaging and connectors

Description:

The 10 Universal Signal Input Module measures up to 10 signal inputs (Analog 0-5V, 0-20 mA or 4-20 mA) for connection to a variety of analog machine sensors or levers and sends the data to a CANopen® network. The user can also select multiple PWM or frequency inputs as well as a counter input. An active high digital input is another user selectable input.

The module can be connected to several CAN devices as well as communicate with a Human Machine Interface (HMI). The sophisticated DSP microprocessor can accommodate complex control algorithms for advanced machine control applications. Standard embedded software is provided. Using an USB-CAN converter and a PC-based CANopen® configuration tool to access the object dictionary (or a CANopen® master on the network), the operator can configure the controller to suit a wide variety of applications. Rugged IP67 rated packaging in addition to a wide-ranging power supply input section for 12V or 24Vdc nominal suits applications in the harsh environment of mobile equipment with on-board battery power.

Ordering Part Numbers:

The SAE J1939 part has been superseded by P/N: AX030120.
The CANopen part has been superseded by P/N: AX030121.

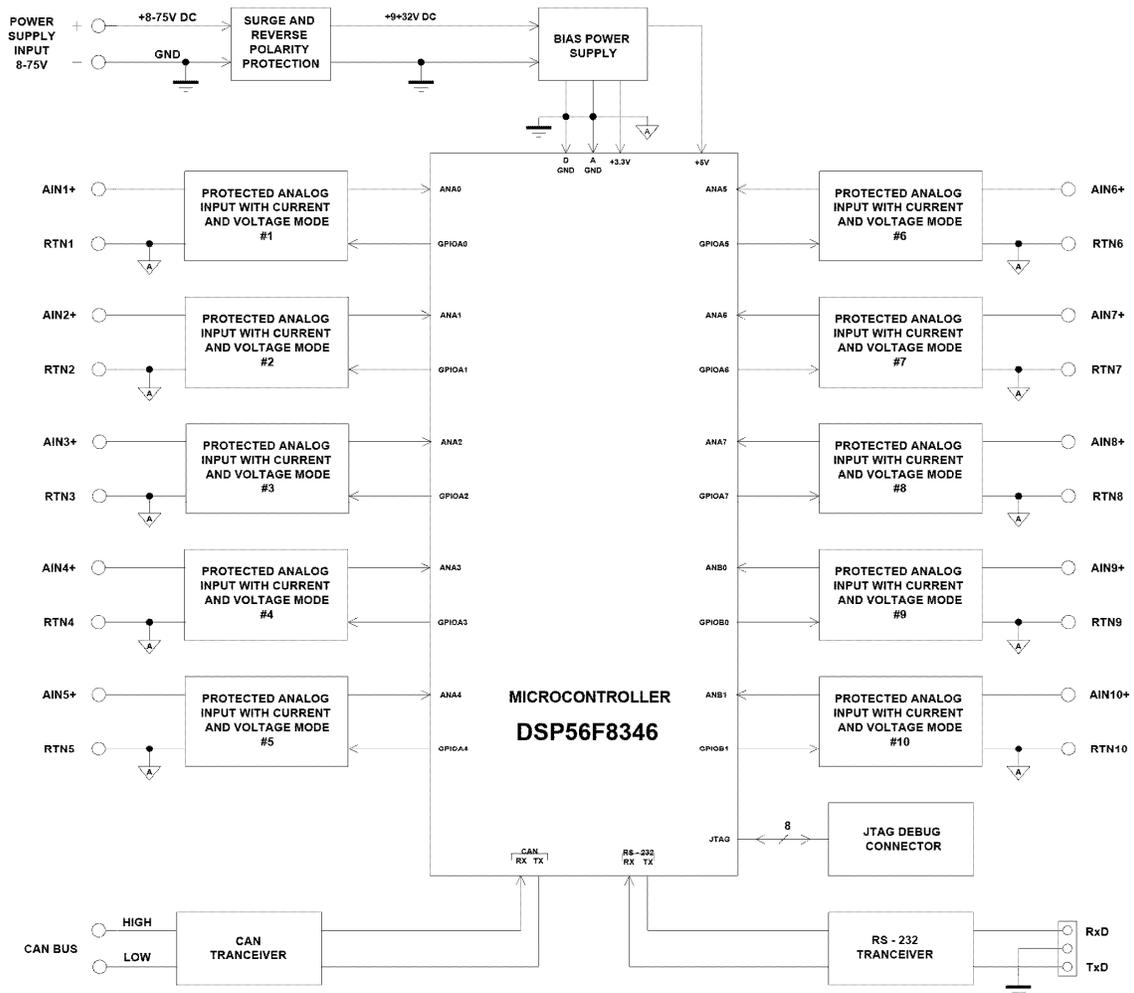10 Analog Input to CAN, CANopen: **AX030101**
EDS File: **EDS-AX030101**

Accessories:
PL-DTM06-12SA-12SB Mating Plug Kit
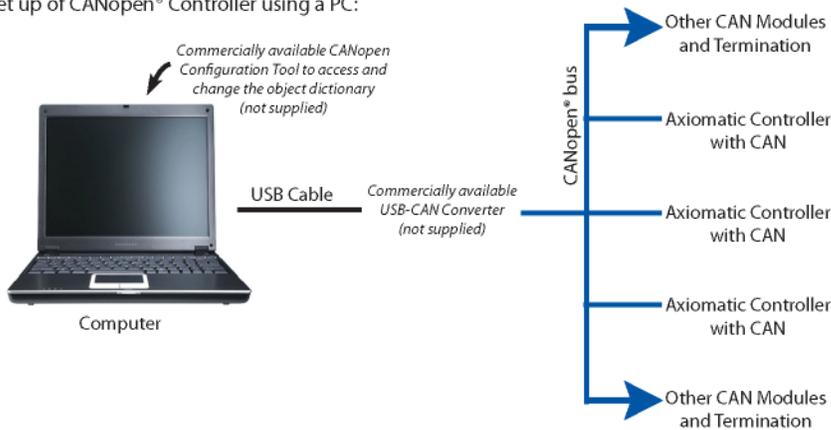(The KIT is comprised of: DTM06-12S, DTM06-12SB, 2 W12S and 24 contacts. The Axiomatic stock # is FG-IOCTRL-19.)

PC-based Configuration Tool: *Industry standard CANopen® PC-based software*

BLOCK DIAGRAM

Set up of AX030101 Controller using a PC:

Technical Specifications:
Power Input Specifications

Power Supply Input - Nominal	12 or 24 Vdc nominal operating voltage 8…75 Vdc power supply range to handle transient voltages
Surge Protection	**Provided**
Reverse Polarity Protection	**Provided**

Minimum and Maximum Operational Voltage and Current Intake

	Voltage Input [V]	Approximate Current Intake [mA]
Minimum	8	295
	12	144
	24	63
	48	31
Maximum	75	22

Signal Input Specifications

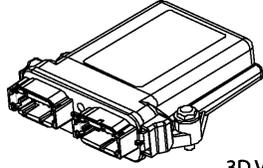| Inputs	10 inputs are configurable from the following. • Analog 12-bit (0-5V, 0-20mA) (4-20mA is user configurable from the 0-20 mA selection) • PWM 12-bit • Frequency • Counter input 16-bit • Digital (active high) [ON when input $\geq$ 1.5V] • Analog On/Off • Input Disabled Broken wire detection is provided. With current inputs, short circuit protection is provided.
Analog GND	10 Analog GND connections are provided.
Short Circuit Protection To Ground and Battery +	Provided
Accuracy	See Input Accuracy section.

Absolute Maximum and Minimum Ratings

Characteristic	Min	Max	Units	Comments
Power Supply	8	75	V dc	
Voltage Input	0	12	V dc	
Current Input	0	21	mA	
PWM Duty Cycle	0	100	%	
PWM Frequency	50	10 000	Hz	
PWM Voltage pk - pk	0	12	V dc	
RPM Frequency	50	10 000	Hz	

Input Accuracy

Input Type	Accuracy	Comments
Voltage	+/- 7 mV (Minimum measurable input = 25 mV)	@ 0.001 V/ bit
Current	+/- 100 uA = +/- 0.1mA	@ 0.1 mA/bit
	+/- 70 uA = +/- 0.07 mA	@ 0.01 mA/bit
PWM	+/- 0.2 %	Freq <= 1 Khz
	+/- 1.0 %	Freq <= 7.5 Khz
	+/- 2.0 %	Freq <= 10 Khz
	+/- 2.0 %	When all inputs set are as PWM
RPM	+/- 0.3 %	

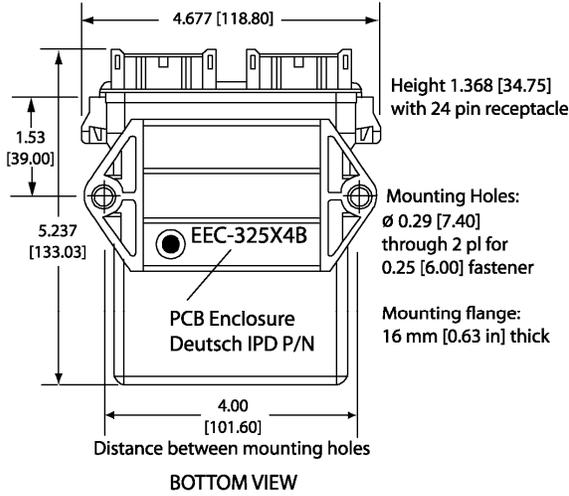## General Specifications

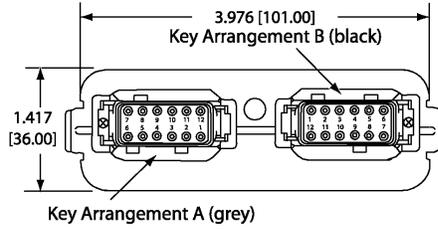|	
Microprocessor	DSP56F8346
CAN Interface	1 CAN port (CANopen®) The controller's object dictionary is compatible with the CiA DS-404 device profile (Device profile for measurement devices and closed-loop controllers). In addition to the standard objects for this device profile, the controller also includes a number of manufacturer specific objects to extend the functionality beyond that of the basic profile. Refer to the user manual for details. The Axiomatic AX030101 is compliant with the following CAN in Automation (CiA) standards. <table><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>
User Interface	A CANopen® master on the network or a PC-based CANopen® configuration tool (not supplied) to access the object dictionary and an USB-CAN converter (not supplied) is used for configuration during initial set-up.
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.
Control Logic	Refer to Control Logic (below) and the User Manual UMAX030101.
Update Time	All inputs, except for frequency and counter inputs, are sampled every 10ms. Frequency and counter inputs are measured based on the value in the 'Measuring Window' setpoint.
Diagnostics	The module can detect the following. • Module Over-Temperature • Power Supply Over Voltage • Power Supply Under Voltage
Electrical Connections	Deutsch DTM series 24 pin receptacle (DTM13-12PA-12PB-R008) Mating plug: Deutsch DTM06-12SA and DTM06-12SB with 2 wedgelocks (WM12S) and 24 contacts (0462-201-20141). 20 AWG wire is recommended for use with contacts 0462-201-20141.
Packaging and Dimensions	High Temperature Nylon housing - Deutsch IPD PCB Enclosure (EEC-325X4B) 4.62 x 5.24 x 1.43 inches 117.42 x 133.09 x 36.36 mm (W x L x H excluding mating plugs)
Operating Conditions	-40 to 85°C (-40 to 185°F)
Weight	0.55 lbs. (0.25 kg)
Protection	IP67, Unit is conformally coated in the housing.

HOUSING DIMENSIONS

Housing Material: High Temperature Nylon (Black)

3D VIEW
Housing with 24 Pin Receptacle

4.677 [118.80]

Height 1.368 [34.75]
with 24 pin receptacle

1.53 [39.00]

5.237 [133.03]

EEC-325X4B

Mounting Holes:
Ø 0.29 [7.40]
through 2 pl for
0.25 [6.00] fastener

PCB Enclosure
Deutsch IPD P/N

Mounting flange:
16 mm [0.63 in] thick

4.00 [101.60]
Distance between mounting holes

BOTTOM VIEW

FRONT VIEW 24-PIN RECEPTACLE (NOT TO SCALE)

3.976 [101.00]
Key Arrangement B (black)

1.417 [36.00]

Key Arrangement A (grey)

Mating Plug Assemblies for 24-pin receptacle:
Deutsch IPD P/N: DTM06-12SA and DTM06-12SB
with wedgelocks WM12S and contacts
(Contact factory for contact specification.)

Dimensions: inches [mm]
excluding mating plug(s)

Typical Connections:

Key Arrangement B (black)

Key Arrangement A (grey)
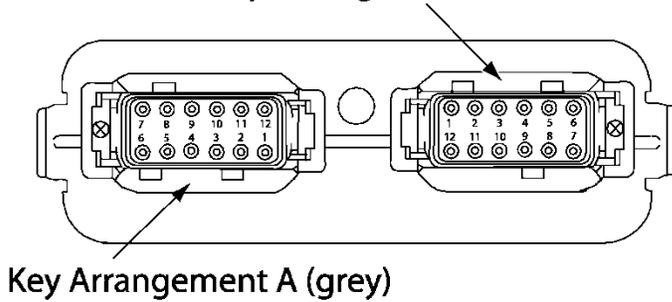
FRONT VIEW 24 PIN RECEPTACLE

Grey Connector		Black Connector	
Pin #	Function	Pin #	Function
1	Analog GND 5	1	Input 6
2	Analog GND 4	2	Input 7
3	Analog GND 3	3	Input 8
4	Analog GND 2	4	Input 9
5	Analog GND 1	5	Input 10
6	Batt -	6	CAN_H
7	Batt +	7	CAN_L
8	Input 1	8	Analog GND 10
9	Input 2	9	Analog GND 9
10	Input 3	10	Analog GND 8
11	Input 4	11	Analog GND 7
12	Input 5	12	Analog GND 6

Control Logic:

Each input can be configured for any one of the following options, and the properties and behavior of the input in each mode is described below. There are several setpoints per channel that are associated with the input and how the data is measured.

INPUT	DESCRIPTION
Input Disabled:	The input is not used, and no CAN messages associated with this channel will be sent to the network.
0 to 5 Volt:	The input is configured to accept a voltage input in the range of 0 to 5V. Signals above 5V will be rectified to 5V. The controller will interpret field value and error detection objects in millivolts (mV).
0(4) to 20 Milliamp:	The input is configured to accept a current input in the range of 0 to 20 mA. Signals above 20mA will be rectified to 20mA. The controller will interpret field value and error detection objects in microamps (µA).
PWM Duty Cycle:	The input is configured to measure the duty cycle of a pulse width modulated (PWM) signal in the range of 0 to 100%dc with frequency between 10 Hz to 10 kHz. The controller will interpret field value and error detection objects in percent duty cycle times 100 (%dc x 100).
Frequency/RPM:	The input is configured to count the number of pulses that occur over the period of the Measuring Window object. At the end of the measuring window, the frequency of the pulses is calculated, and the FV is updated. Field value and error detection objects will be interpreted in hertz (Hz).
16-bit Counter:	The input is configured to count pulse on the input until the value in the Measuring Window object is reached. While the counter is active, a timer with a 1ms resolution is running in the background. When the count has been reached, the value in the 1ms timer is captured and updated to the Field Value object. The timer is reset until the count value once again reaches the Measuring Window. Error detection objects are not used, since error detection is not possible in this mode.
Digital (High):	This mode is selected by setting the Operating Mode to 'Digital'. The input is configured to read the state of an active high digital input (switch is connected to a +V signal when ON.) The input is read by the DI Read State object in the Digital Input Block. Error detection objects are not used, since error detection is not possible in this mode. The Field Value and Process Value are always 0.
Analog ON/OFF	This mode is selected by setting the Operating Mode to 'ON/OFF'. The input is controlled by the values in the Low and High Threshold objects, and is read by the DI Read State object in the Digital Input Block. In this mode, however, the type of input is still determined by the Sensor Type in the Analog Input Block. The Field Value reflects the value of the input in the appropriate unit. The Process Value is always 0.

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

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.

Form: TDAX030101-09/24/14