![AXIOMATIC Global Electronic Solutions]

Universal Input, Single Output Valve Controller
CAN (SAE J1939)
with Electronic Assistant
P/N: AX021610

Features:

- 1 universal signal input (voltage, current, resistive, PWM, frequency or digital)
- 1 output: proportional current 0-3 A; proportional voltage up to Vps; PWM signal; hotshot digital; digital on/off; or voltage 0-Vps (user selectable)
- 12Vdc, 24Vdc nominal
- 1 CAN (SAE J1939) port
- CANopen® available on request
- Compact enclosure with integral 8 pin connector
- LED indicator
- IP67
- CE marking
- Flexible user programming for application-specific control logic via the CAN based Electronic Assistant.

Ordering Part Numbers:

SAE J1939 Controller:
For baud rate, refer to the table below for the appropriate P/N.

| Model P/N	Baud Rate	Standard Reference
AX021610	250 kBit/s	J1939/11, J1939/15.
AX021610-01	500 kBit/s	J1939/14. New standard
AX021610-02	1Mbit/s	Non-standard

Accessories:
AX070112 Mating Plug Kit :1 DT06-08SA, 1 W8S, 8 0462-201-16141, 3 114017

Electronic Assistant: **AX070502**

Description: The Universal Input to Single Output Valve Controller with LED is designed for versatile control of a universal input and a proportional valve output. Its flexible hardware design allows for the controller to have a wide range of input and output types. The sophisticated control algorithms/logical function blocks allow the user to configure the controller for a wide range of applications without the need for custom firmware. The setpoints are configurable using Axiomatic service tool, Electronic Assistant (EA). The universal input can be configured to read analog signals: *Voltage, Current, and Resistance* as well as digital signals: *Frequency/RPM, PWM, Digital, and Counter types*. Similarly, the output can be configured to different types: *Proportional Current, Voltage, PWM, Hotshot Digital Current and Digital (ON/OFF).* Each output consists of a high side half-bridge driver able to source up to 3 Amps with hardware shutdown at 4 Amps. Additionally, the controller includes a dual LED which is visible from outside the housing. The LED can be configured in various ways to visually inform the user of the controller's operations.

BLOCK DIAGRAM
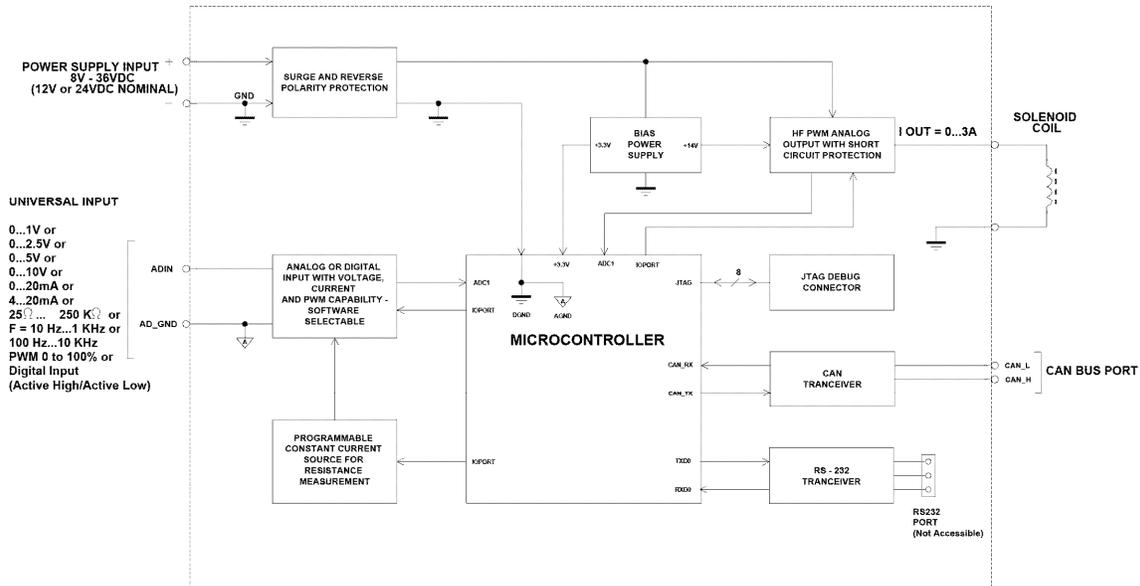
Technical Specifications:

Input

Power Supply Input - Nominal	12Vdc or 24Vdc nominal (8…36 VDC power supply range)
Protection	Reverse polarity protection is provided. Overvoltage protection up to 71V is provided. Overvoltage (undervoltage) shutdown of the output load is provided.
CAN	SAE J1939 Commands
Universal Signal Input	Refer to Table 1.0 All inputs are user selectable.

Table 1.0 – **Input – User Selectable Options**	
Analog Input Functions	Voltage Input, Current Input or Resistive Input
Voltage Input	0-1V (Impedance 1 MOhm) 0-2.5V (Impedance 1 MOhm) 0-5V (Impedance 200 KOhm) 0-10V (Impedance 133 KOhm for 0-5V, 133 to 20 KOhm for 5-10V)
Current Input	0-20 mA (Impedance 124 Ohm) 4-20 mA (Impedance 124 Ohm)
Resistive Input	25Ω to 250 kΩ
Digital Input Functions	Discrete Input, PWM Input, Frequency Input
Digital Input Level	Up to Vps
PWM Input	0 to 100% 10 Hz to 1kHz 100 Hz to 10 kHz
Frequency Input	10 Hz to 1kHz 100 Hz to 10 kHz
Digital Input	Active High (to +Vps), Active Low Amplitude: 0 to +Vps
Counter Input	0 Hz to 10 kHz
Input Impedance	1 MOhm High impedance, 10KOhm pull down, 10KOhm pull up to +14V
Input Accuracy	< 1%
Input Resolution	12-bit

Output

CAN	SAE J1939 Messages
Output	Up to 3A Half-bridge, High Side Sourcing, Current Sensing, Grounded Load High Frequency (25 kHz) The user can select the following options for output using the EA. • Output Disable • Output Current (PID loop, with current sensing) (0-3A) • Hotshot Digital • Proportional Output Voltage (up to Vps) • Output PWM Duty Cycle (0-100% D.C.) • Digital On/Off (Gnd-Vps)
Configurable Parameters	Refer to the user manual UMAX021610 and Table 2.0.
Output Accuracy	Output Current mode ≤1% Output Voltage mode ≤5% Output PWM Duty Cycle mode ≤0.1%
Output Resolution	Output Current mode 1 mA Output Voltage mode 0.1V Output PWM mode 0.1%
Protection	Overcurrent and short circuit protection

Table 2.0. Output Parameters		
Name	**Range**	**Default**
Output Type	Drop List	12 – Voltage 0V to 5V
Output At Minimum Command	0 to 60000	0
Output At Maximum Command	Drop List	0 – Pulses within Measuring Window
Output At Override Command	Depends on Sensor Type	0 (V)
Dither Frequency	Depends on Sensor Type	5 (V)
Dither Amplitude	0 to 10000	100 Pulses
Ramp Up (Min to Max)	Drop List	0 – Falling Edge
Ramp Down (Max to Min)	Drop List	0 - False
PWM Output Frequency	1 to 25000	25000 Hz
Hold Current	Drop List	0 – Pullup/down Off
Hotshot Current	Drop List	0 – Active High
Hotshot Time	Drop List	0 - None
Digital Response	Drop List	0 – Normal On/Off
Digital Blink Rate	0 to 60000	1000 ms
Digital Output ON Time	0 to 60000	1000 ms
Digital Output OFF Time	0 to 60000	500ms
Complete Full ON/OFF Cycle	Drop List	0 – FALSE
Control Source	Drop List	2 – Universal Input Measured
Control Number	Depends on Source	1
Enable Source	Drop List	0 – Control Not Used
Enable Number	Depends on Source	1
Enable Response	Drop List	0 – Enable When On, Else Shutoff
Override Source	Drop List	0 – Control Not Used
Override Number	Depends on Source	1
Override Response	Drop List	0 – Override when ON
Output Fault Response	Drop List	0 – Shutoff Output
Output in Fault Mode	Depends on Type	500mA

General Specifications

Microprocessor	STM32F205RET6 32-bit, 512 Kbit program flash
Quiescent Current	42 mA @ 12Vdc; 33 mA @ 24Vdc Typical
LED Indicator	User configurable to react to different events or faults
Control Logic	User programmable functionality using Electronic Assistant
Communications	1 CAN port (SAE J1939), CANopen® is available on request. Refer to ordering part numbers for a list of models with different baud rates.
User Interface	Electronic Assistant® for *Windows* operating systems comes with a royalty-free license for use. The Electronic Assistant® requires an USB-CAN converter to link the device's CAN port to a *Windows*-based PC. An Axiomatic USB-CAN Converter is part of the Axiomatic Configuration KIT, ordering P/N: AX070502.
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	Molded Enclosure, integral connector Nylon 6/6, 30% glass Ultrasonically welded 3.47 x 2.75 x 1.31 inches (88.2 x 70.0 x 33.3 mm) L x W x H including integral connector Refer to the dimensional drawing.
Protection	IP67
Vibration	MIL-STD-202G, Method 204D test condition C (Sine) and Method 214A, test condition B (Random) 10 g peak (Sine) 7.68 Grms peak (Random)
Shock	MIL- STD-202G, Method 213B, test condition A 50g (half sine pulse, 9ms long, 8 per axis)
Approvals	CE marking
Weight	0.156 lb. (0.071 kg)
Electrical Connections	Integral TE Deutsch 8 pin receptacle (P/N: DT04-08PA) 18 AWG wire is recommended for use with contacts 0462-201-16141. A mating plug kit is available. Ordering P/N: **AX070112 i**s comprised of 1 DT06-08SA, 1 W8S, 8 0462-201-16141, and 3 114017.

PIN #	FUNCTION
1	CAN_L
2	CAN_H
3	Output GND
4	Universal Input
5	Input Analog GND
6	Output +
7	Batt -
8	Batt +

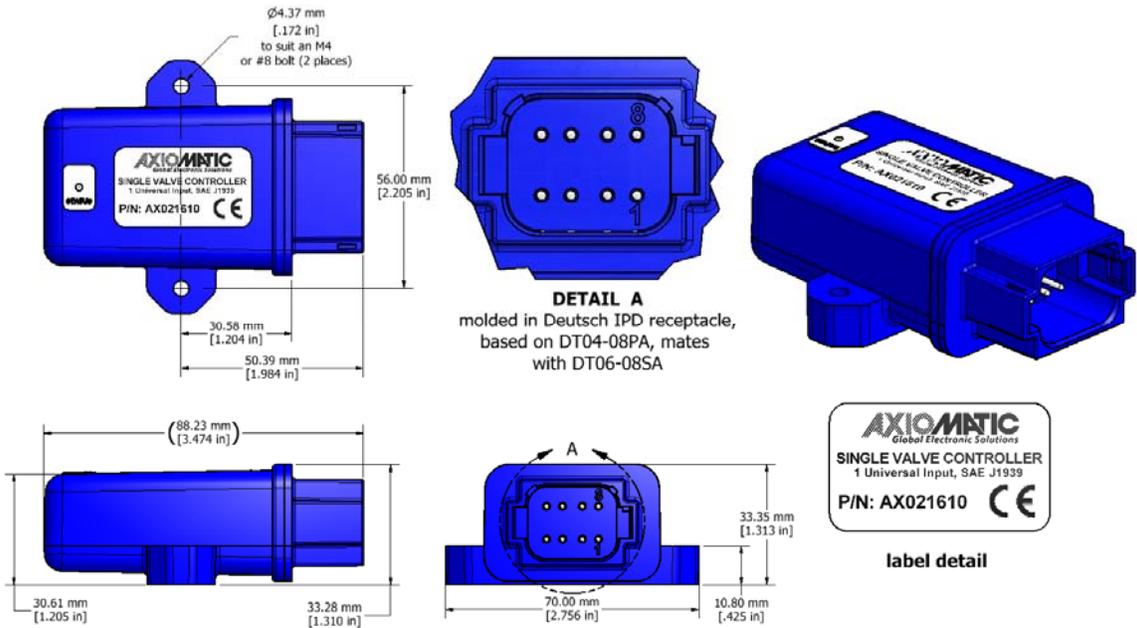| Mounting	Mounting holes are sized for #8 or M4 bolts. The bolt length will be determined by the end-user's mounting plate thickness. The mounting flange of the controller is 0.425 inches (10.8 mm) thick.
	If the module is mounted without an enclosure, it should be mounted vertically with connectors facing left or right to reduce likelihood of moisture entry.
	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.
	No wire or cable harness should exceed 30 meters in length. The power input wiring should be limited to 10 meters.
	All field wiring should be suitable for the operating temperature range.
	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).

Figure 1.0. – Dimensional Drawing

Note: CANopen® is a registered community trademark 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: TDAX021610-03/20/20