CAN-Dual Valve Controller

CAN (SAE J1939)

with Electronic Assistant®

P/N: AX022002

Features:

- Two independent software controlled outputs selectable as: Proportional Current (up to 3A); Hotshot Digital; PWM Duty Cycle; Proportional Voltage; or On/Off Digital types (4A)
- 9…60VDC (12VDC or 24VDC nominal)
- 1 CAN (SAE J1939) port
- Aluminum enclosure with integral 12-pin connector
- IP67
- **Electronic Assistant®** for user programmability

Applications: The controller is designed to meet the

rugged demands of mobile equipment and heavy duty industrial machine control applications. These applications include, but are not limited to the following.

- PID Closed Loop Valve Control
- Hydraulic Valve Control

Ordering Part Numbers:

Controller: **AX022002**
Accessories: **AX070105** Mating Plug Kit (DT06-12SA, W12S, 12 0462-201-16141, 3 plugs)
AX070502 Electronic Assistant® Configuration KIT includes the following. USB-CAN Converter P/N: AX070501 1 ft. (0.3 m) USB Cable P/N: CBL-USB-AB-MM-1.5 12 in. (30 cm) CAN Cable with female DB-9 P/N: CAB-AX070501 AX070502IN CD P/N: CD-AX070502, includes: **Electronic Assistant®** software; EA & USB-CAN User Manual UMAX07050X; USB-CAN drivers & documentation; CAN Assistant (Scope and Visual) software & documentation; and the SDK Software Development Kit. **NOTE: To order this kit, you need only to specify P/N: AX070502.**

Description: The CAN-2 Valve Controller (CAN-2O) is a highly programmable controller,

allowing the user to configure it for their application. It must be integrated into a CAN J1939 network of controllers. Its sophisticated control algorithms allow for open or closed loop drive of the proportional outputs. All logical function blocks on the unit are inherently independent from one another, but can be programmed to interact in a large number of ways. While Figure 1A shows the hardware features, Figure 1B shows the logical function blocks (software) available on the CAN-2O. All setpoints are user configurable using the Electronic Assistant®.

The CAN-2O has a number of built-in protection features that can shut off the outputs in adverse conditions. These features include hardware shutoffs to protect the circuits from being damaged as well as software shutdown features that can be enabled in safety critical systems.
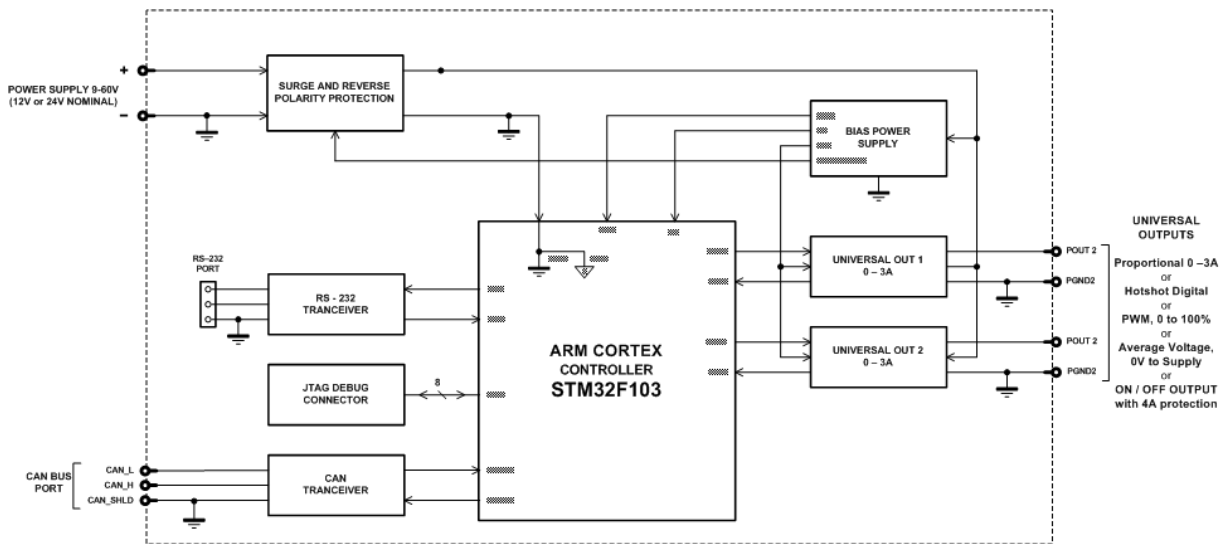
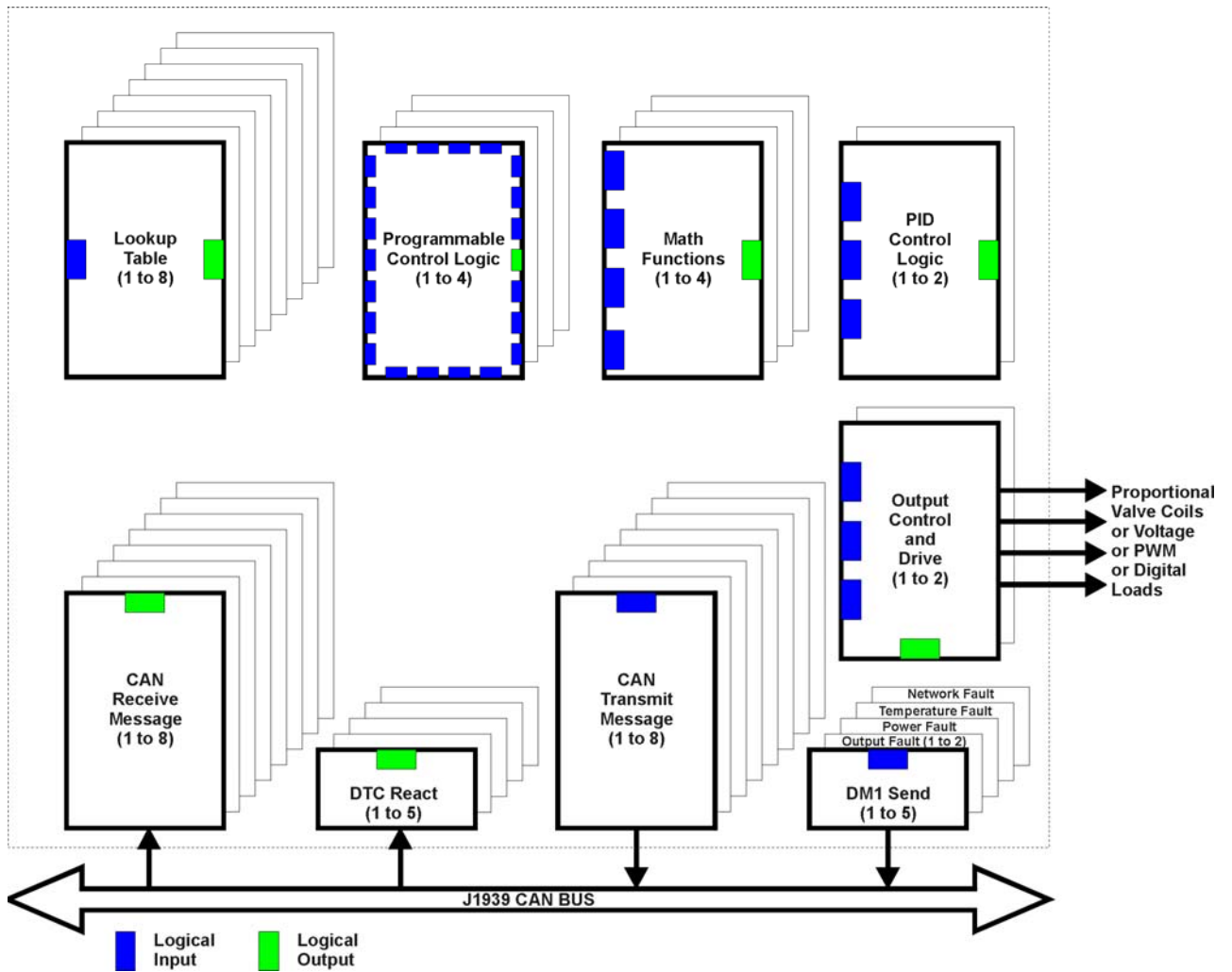**Figure 1A – Hardware Functional Block Diagram**

Figure 1B –Logical Functional Block Diagram
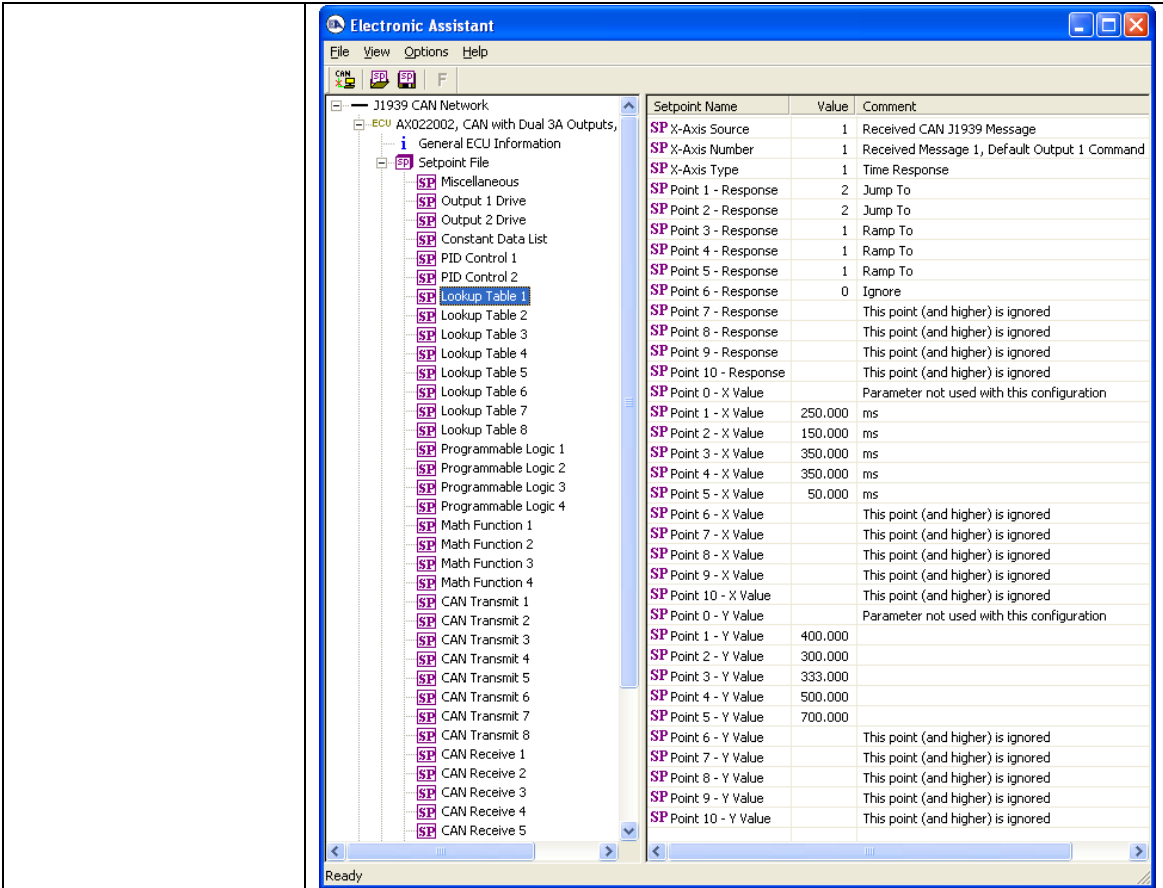
Technical Specifications:

Inputs

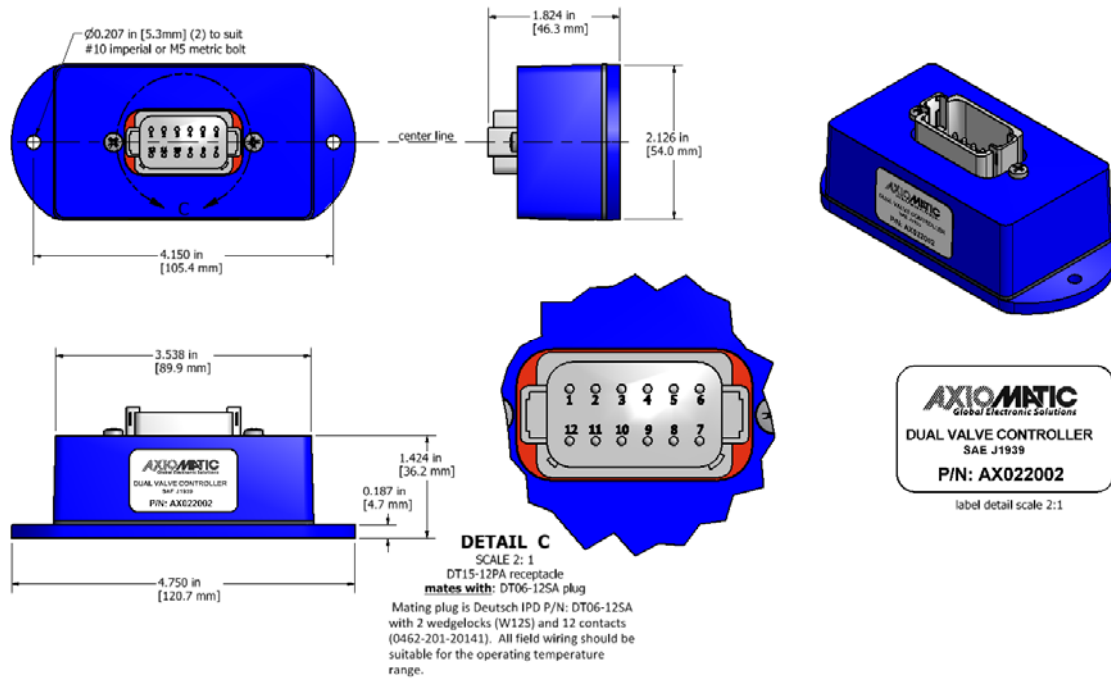|	
Power Supply Input	12VDC or 24VDC nominal (9…60 VDC power supply range)
Protection	Reverse polarity protection is provided. Surge protection up to 75V is provided. Under-voltage protection (software, hardware shutdown at 7.5V) is provided. Over-voltage shutdown of the output load is provided.
CAN	SAE J1939 Command

Outputs

CAN	SAE J1939 Messages
Output	Two independent software controlled outputs selectable as: Proportional Current; Hotshot Digital; PWM Duty Cycle; Proportional Voltage; or On/Off Digital types Half-bridge outputs, current sensing, grounded load. High side sourcing up to 3A Current Outputs: 1mA resolution, accuracy +/- 2% error Software controlled PID current Fully configurable dither from 50 to 400Hz. High frequency drive at 25kHz *Note: Both outputs use the same dither and drive frequencies* Voltage Outputs: 0.1V resolution, accuracy +/- 3% error Average output based on unit power supply High frequency drive at 25kHz PWM Outputs: 0.1% resolution, accuracy +/- 1% error Output Frequency: 1Hz to 25kHz Configurable frequency ONLY if no current output types are used, otherwise default 25kHz is used Digital On/Off: Load at supply voltage must not draw more than 3A.
Protection for Output + Terminal	Fully protected against short circuit to ground or +Vcc Grounded short circuit protection will engage at 4.5A +/- 0.5A Unit will fail safe in the case of a short-circuit condition, and is self-recovering when the short is removed.

General Specifications

Microprocessor	STM32F103 32-bit, 128 KByte flash program memory
Control Logic	User programmable functionality using Electronic Assistant® Refer to UMAX07050X for details. (Application-specific control logic or factory programmed setpoints are available on request.)
Diagnostics	Each input and output channel can be configured to send diagnostic messages to the J1939 CAN network if the I/O goes out of range. Diagnostic data is stored in a non-volatile log. Refer to Section 1.7 for details
Additional Fault Feedback	There are several types of faults that the controller will detect and provide a response: unit power supply under-voltage and over-voltage, microprocessor over temperature and lost communication. They can be sent to the J1939 CAN bus.
Communications	1 CAN port (SAE J1939), CANopen is available on request.
Reflashing over CAN	Yes, per J1939 standard using Electronic Assistant® 29-bit IDs, 250 kbps baud rate
User Interface	Electronic Assistant® for *Windows* operating systems, P/N: AX070502 It comes with a royalty-free license for use on multiple computers.

	Electronic Assistant
	File View Options Help
	
	J1939 CAN Network
	  AX022002, CAN with Dual 3A Outputs,
	    General ECU Information
	    Setpoint File
	      Miscellaneous
	      Output 1 Drive
	      Output 2 Drive
	      Constant Data List
	      PID Control 1
	      PID Control 2
	      Lookup Table 1
	      Lookup Table 2
	      Lookup Table 3
	      Lookup Table 4
	      Lookup Table 5
	      Lookup Table 6
	      Lookup Table 7
	      Lookup Table 8
	      Programmable Logic 1
	      Programmable Logic 2
	      Programmable Logic 3
	      Programmable Logic 4
	      Math Function 1
	      Math Function 2
	      Math Function 3
	      Math Function 4
	      CAN Transmit 1
	      CAN Transmit 2
	      CAN Transmit 3
	      CAN Transmit 4
	      CAN Transmit 5
	      CAN Transmit 6
	      CAN Transmit 7
	      CAN Transmit 8
	      CAN Receive 1
	      CAN Receive 2
	      CAN Receive 3
	      CAN Receive 4
	      CAN Receive 5
	
	Ready
	
	Setpoint Table:
	
	| Setpoint Name
		Value	Comment

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X-Axis Source	1	Received CAN J1939 Message
X-Axis Number	1	Received Message 1, Default Output 1 Command
X-Axis Type	1	Time Response
Point 1 - Response	2	Jump To
Point 2 - Response	2	Jump To
Point 3 - Response	1	Ramp To
Point 4 - Response	1	Ramp To
Point 5 - Response	1	Ramp To
Point 6 - Response	0	Ignore
Point 7 - Response		This point (and higher) is ignored
Point 8 - Response		This point (and higher) is ignored
Point 9 - Response		This point (and higher) is ignored
Point 10 - Response		This point (and higher) is ignored
Point 0 - X Value		Parameter not used with this configuration
Point 1 - X Value	250.000	ms
Point 2 - X Value	150.000	ms
Point 3 - X Value	350.000	ms
Point 4 - X Value	350.000	ms
Point 5 - X Value	50.000	ms
Point 6 - X Value		This point (and higher) is ignored
Point 7 - X Value		This point (and higher) is ignored
Point 8 - X Value		This point (and higher) is ignored
Point 9 - X Value		This point (and higher) is ignored
Point 10 - X Value		This point (and higher) is ignored
Point 0 - Y Value		Parameter not used with this configuration
Point 1 - Y Value	400.000	
Point 2 - Y Value	300.000	
Point 3 - Y Value	333.000	
Point 4 - Y Value	500.000	
Point 5 - Y Value	700.000	
Point 6 - Y Value		This point (and higher) is ignored
Point 7 - Y Value		This point (and higher) is ignored
Point 8 - Y Value		This point (and higher) is ignored
Point 9 - Y Value		This point (and higher) is ignored
Point 10 - Y Value		This point (and higher) is ignored	
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 Temperature	Operating: -40 to 85°C (-40 to 185°F) Storage: -50 to 105°C (-58 to 221°F)
Packaging	Aluminum enclosure, integral Deutsch IPD connector Encapsulated Refer to the dimensional drawing.
Protection	IP67 rating for the product assembly
Application	Suitable for moist, high shock, vibrating and non-hazardous environments
Weight	0.70 lb. (0.32 kg)

DETAIL C
SCALE 2 : 1
DT15-12PA receptacle
mates with: DT06-12SA plug

Mating plug is Deutsch IPD P/N: DT06-12SA
with 2 wedgelocks (W12S) and 12 contacts
(0462-201-20141). All field wiring should be
suitable for the operating temperature
range.

DUAL VALVE CONTROLLER
SAE J1939
P/N: AX022002

label detail scale 2:1

Electrical Connections	12 pin Deutsch IPD connector P/N: DT15-12PA
	A mating plug kit is available as Axiomatic P/N: **AX070105**. It is comprised of Deutsch IPD P/N's DT06-12SA, W12S, 12 0462-201-16141, and 3 plugs.

CAN and I/O Connector	
Pin #	**Function**
1	Output 1 + (Sourcing to 3A)
2	Output 1 GND
3	BATT +
4	CAN Shield
5	CAN Low
6	CAN High
7	Not Used (plug)
8	Not Used (plug)
9	Frame GND
10	BATT -
11	Output 2 GND
12	Output 2 + (Sourcing to 3A)

Installation	The controller can be mounted directly on the valve block or remotely.
	Mounting holes are sized for #10 or M4.5 bolts. The bolt length will be determined by the end-user's mounting plate thickness. The mounting flange of the controller is 0.19 inches (4.75 mm) thick.
	If the module is mounted without an enclosure, it should be mounted to reduce the likelihood of moisture entry. 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).
	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.
	All field wiring should be suitable for the operating temperature range of the module.
	All chassis grounding should go to a single ground point designated for the machine and all related equipment.

CANopen® is a registered community trade mark of CAN in Automation e.V.
Electronic Assistant® is a registered U.S. trade mark of Axiomatic Technologies Corporation.
 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: TDAX022002-06/04/12