Valve Controller – 6 On/Off
P/N: AX021301
2 Analog and 3 Frequency Command Inputs
6 On/Off Outputs (Option: PWM)
CANopen®

Features:

- 2 user selectable analog inputs
  (0-5V, 0-20 mA, 4-20 mA, PWM, Frequency/RPM, Digital Active High)
- 3 user selectable frequency inputs
  (Digital Active High, Digital Active Low, PWM, Frequency/RPM)
- 6 outputs for hydraulic On/Off valves
- User selectable option for outputs: Pulsed, Timed, PWM
- 12V or 24VDC power (nominal)
- Standard control logic
- 1 CAN (CANopen®), 1 RS-232
- SAE J1939 module available (P/N: AX021300)
- Hardware is available as a platform for application-specific software or setpoints
- User programmable functionality
- .EDS provided to interface to standard CANopen® tools
- Rugged IP67 packaging and connectors

Description: The controller drives up to 6 on/off valves at 5 Amps over a CANopen® network. Alternatively, the user can select pulsed, timed or PWM output types. It accepts up to 2 analog inputs (0-5V, 0-20 mA or 4-20 mA) and 3 digital inputs for connection to a variety of analog machine sensors or levers. The user can also select PWM, Frequency/RPM or 16-bit Counter inputs. Each input can be configured to measure the input value and send the data to the CAN network using a TPDO. In addition, any output on the controller could be configured to use any of the inputs as a control signal or an enable instead of taking the command information from the CAN bus. Standard embedded software is provided. The AX021301 is a versatile controller compliant with the CiA standard DS-401. It supports many objects from that device profile as well as some manufacturer objects to provide expanded functionality. All objects are user configurable using standard commercially available tools that can interact with a CANopen® Object Dictionary via an .EDS file. Depending on how they set it up, the user can easily switch from having the output respond to CAN commands; using the discrete inputs to drive some or all of the outputs; or having them go to an individually preset state in error mode. Rugged IP67 rated packaging in addition to a 9-36V power supply input section suits mobile equipment control applications.

Applications:

- Off-highway equipment
- Hydraulic systems

Ordering Part Numbers:

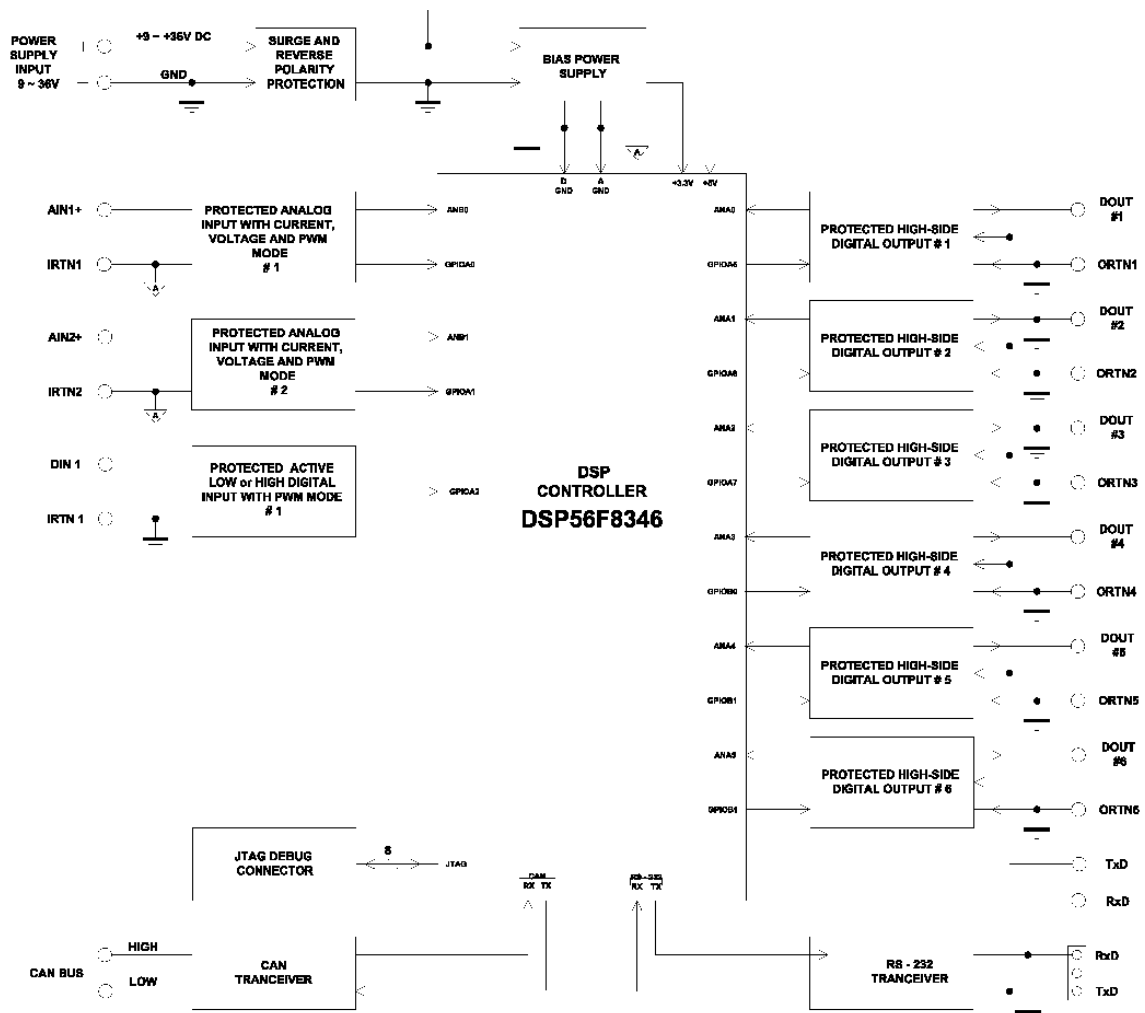| |
|---|
| CANopen® 6 On/Off Valve Controller: **AX021301**
EDS File, User Manual: **CD-AX021301** |
| Accessories:
PL-DTM06-12SA-12SB Mating Plug Kit
(The KIT is comprised of: DTM06-12S, DTM06-12SB, 2 W12S and 24 contacts.
The Axiomatic stock # is FG-IOCTRL-19.) |

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/.

Inputs

Power Supply Input - Nominal	12 or 24VDC nominal (9…36 VDC power supply range) Surge protection is provided. NB. The max. total current draw on the power supply input pins is 7 A @ 24VDC, at one time.
Reverse Polarity Protection	Provided
Analog Inputs	2 inputs (Refer to Table 1.0 and Table 2.0) Inputs are user selectable. - Analog (0-5V, 0-20mA or 4-20mA) - PWM (up to 5kHz, 0-100% D.C.) - Frequency - Digital (Active High)
Analog GND	Analog GND connections are provided.
Digital Inputs	3 inputs (Refer to Table 1.0 and Table 2.0.) Inputs are user selectable. - Digital (Active High or Active Low) - PWM (up to 5kHz, 0-100% D.C.) - Frequency
Digital GND	A digital GND is provided.

Table 1.0 Selection of Inputs to AX021300	
Input Type	Description
# of Inputs	There are a total of 5 input channels available, which are user selectable from a variety of input types. *Refer to the user manual for details.*
Disable Inputs	Each input can be configured as a disable input command. When disable is selected, no CAN messages associated with that channel are sent to the network.
Analog Inputs	Up to 2 analog inputs are available. 0…5VDC 4…20mA or 0…20mA
Digital Inputs	Up to 5 active high, digital inputs is user selectable. Up to 2 active low, digital inputs is user selectable. Active High - The input is configured to read the state of the input (switch is connected to a +V signal when ON). Active Low – The input is configured to read the state of the input (switch is connected to a GND signal when ON).
PWM Signal Inputs	Up to 5 PWM inputs are available to interface to a PWM signal from an ECM, PLC or other. PWM Signal Frequency: up to 6kHz Amplitude: 5-12V PWM Duty Cycle: 0 to 100%
Pulse Inputs	Up to 5 pulse (Frequency) inputs are available.

Table 2.0 - Absolute Maximums for Inputs

	Min	Max	Units	Comments
Power Supply	9	36	V dc	➢ Reverse Polarity and Surge protection is provided. ➢ Software, under and over voltage security features.
Analog Input Voltage	0.05	36	Vdc	
Analog Input Current	0	21	mA	
PWM Input Frequency	50	6000	Hz	➢ 200 =< Freq <= 1000 Hz recommended for better accuracy
PWM duty cycle Input	0	100	%	
Freq/RPM Input Frequency	10	65000	Hz	
Digital Input Voltage	4	36	Vdc	

Table 3.0 - Input Accuracy

Input Type	Accuracy
0 – 5 VDC	+/- 1 % of actual input voltage
0 (4) – 20 mA	100 %
PWM	+/- 0.1 % duty cycle
Frequency / RPM	+/- 0.15 % of actual input frequency

Outputs

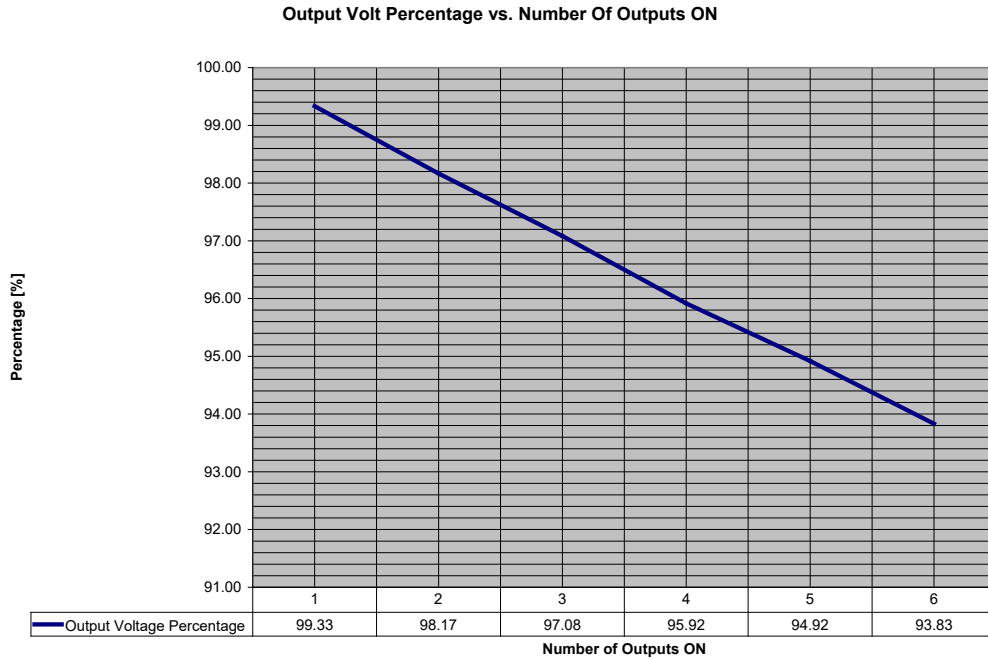| Output Type	6 outputs are user selectable from the following. • Digital • Timed • Pulsed • PWM The output response is user selectable from the following. • Disabled • Normal On/Off • Inverted On/Off • Latched There are thirteen setpoints per channel that are associated with the output and how it is controlled and responds to the control signals.
Digital Output	High Side (sourcing) Drives up to 6 On/Off Valves (up to 5A each) The output toggles between OFF and ON states based on the states of the control logic. NB. The maximum total current draw permitted on the power supply input pins is 6 Amps @ 24VDC, at one time.
Pulsed Output	The pulsed output type is controlled by a digital ON-OFF state. However, unlike a digital output, when a pulsed output logic state is ON, the output will be turned on/off at the frequency set in object 2230h DO Output Frequency, with the duty cycle set in object 2231 DO Duty Cycle.
Timed Output	The pulsed output type is controlled by a digital ON-OFF state. However, unlike a digital output, when a timed output logic state comes ON, the output will be turned ON after the value in object 2240h DO Start Up Delay has elapsed. The output will stay ON for the time set in object 2241h DO ON Time, then shut off (even though the logic state is still ON). If object 2242h DO Timer Repeat is TRUE, then the output will be OFF for the time set in object 2243h DO OFF Time before coming back ON. The ON/OFF cycle will continue while the output logic state is still ON.
PWM Output	For this output type, the output will be switched at the frequency in object 2230h DO Output Frequency. The duty cycle is fixed at minimum 0% and maximum 100%. The output PWM will be proportional to the input measured. The PWM output is linearly defined by the input minimum and maximum set in objects 2420h and 2421h.
Overcurrent and Short Circuit Protection	Provided
Output Voltage Regulation	93 % of Supply voltage when all 6 outputs are ON (See Figure 1.0.)

Output Volt Percentage vs. Number Of Outputs ON

Output Voltage Percentage	99.33	98.17	97.08	95.92	94.92	93.83
Number of Outputs ON	1	2	3	4	5	6

Figure 1.0 - % Output Voltage vs. No. of Outputs ON

General Specifications

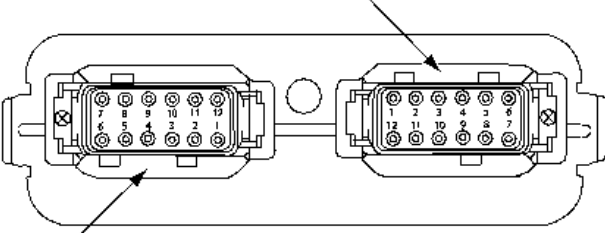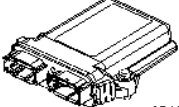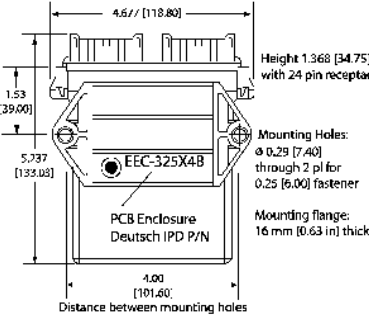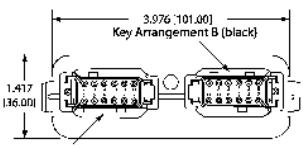|	
Microprocessor	DSP56F8346
Control Logic	Standard control logic (Refer to User Manual UMAX021301.) For application-specific control logic, contact Axiomatic.
Communications	1 CAN port (CANopen®) Compliant with the CiA standard CiA DS-401 V3.0 – *CANopen® device profile for Generic I/O modules* (CAN in Automation 2008) 1 RS-232 port
User Interface	EDS File is provided. The controller architecture consists of a set of internal functional blocks, which can b̶ programmed and arbitrarily connected together to achieve the required system fund̶ specific application. All objects are user configurable using standard commercially a̶ that can interact with a CANopen® Object Dictionary via an .EDS file.
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 are placed between CAN_H and CAN_L terminals at both ends of the network.
Diagnostics	Current draw from the solenoid(s) is read by the microprocessor and stored in memory.

Electrical Connections	Refer to Table 3.0. 24 pin receptacle (equivalent TE Deutsch P/N: DTM13-12PA-12PB-R008) Mating plug – equivalent to the TE Deutsch P/Ns: DTM06-12SA and DTM06-12SB, with 2 wedgelocks (WM12S) and 24 contacts (1062-20-0122) that accept 18 AWG wire. **Use dielectric grease on the pins when installing the controller.** ### Key Arrangement B (black) ### Key Arrangement A (grey) ### FRONT VIEW 24 PIN RECEPTACLE
Packaging and Dimensions	High Temperature Nylon PCB Enclosure - (equivalent TE Deutsch P/N: 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) **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] Mounting Holes: Ø 0.29 [7.40] through 2 pl for 0.25 [6.00] fastener 5.237 [133.03] EEC-325X4B 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)
Weight	0.55 lbs. (0.25 kg)
Operating Conditions	-40 to 85°C (-40 to 185°F)
Protection	IP67, Unit is conformally coated in the housing. Plugs carry an IP69 rating.

Table 3.0 - Typical Connections, AX021301

Grey Connector		Black Connector	
Pin #	Function	Pin #	Function
1	Ground 6	1	BATT +
2	Ground 5	2	CAN HI
3	Ground 4	3	Serial Communication TXD (Not Used)
4	Ground 3	4	Serial Communication RXD (Not Used)
5	Ground 2	5	Input 1 (Analog)
6	Ground 1	6	Input 2 (Analog)
7	Digital Output 1	7	Ground
8	Digital Output 2	8	Input 5 (Digital)
9	Digital Output 3	9	Input 4 (Digital)
10	Digital Output 4	10	Input 3 (Digital)
11	Digital Output 5	11	CAN LO
12	Digital Output 6	12	BATT -

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

Form: TDAX021301-06/12/23