TECHNICAL DATASHEET #TDAX030120A

10 Universal Signal Inputs CAN Controller

CAN (SAE J1939)

Voltage, Current, Digital, Frequency, PWM, Counter Inputs
5 V Reference
Configurable with Axiomatic Electronic Assistant
P/N: AX030120A

Features

- 10 signal inputs user selectable as 0-1 V, 0-2.5 V, 0-5 V, 0-10 V, 0-20 mA, 4-20 mA, Frequency, PWM, Counter, and Digital
- 12, 24, or 48 VDC (nominal) power input
- 5 V reference voltage
- 1 CAN port (SAE J1939) (CANopen® model P/N: AX030121A)
- EMC compliance (CE / UKCA marking)
- Rugged TE Deutsch enclosure and connectors
- Axiomatic Electronic Assistant for parameter configuration

Applications

The controller is designed to meet the rugged demands of construction equipment, power generator sets, and heavy-duty industrial machine control applications.

Ordering Part Numbers

10 Universal Signal Inputs, 1 SAE J1939 with Auto-Baud-Rate Detection - P/N: **AX030120A**

CANopen® model - P/N: **AX030121A**

Accessories:
PL-DTM06-12SA-12SB Mating Plug Kit
Configuration Tool: Axiomatic Electronic Assistant KIT - P/N: **AX070502** or **AX070506K**

Description

The 10 Universal Signal Input Module accepts up to 10 analog or digital type inputs (0-1 V, 0-2.5 V, 0-5 V, 0-10 V, 0-20 mA or 4-20 mA, Frequency PWM, Counter, Digital). The modules can be connected to a variety of analog machine sensors or levers, PLCs, switches, PWM signals, etc. It interfaces with the machine's CAN network (SAE J1939). Standard embedded software is provided. The rugged IP67 rated enclosure and a wide-ranging power supply input section for 12, 24, or 48 VDC power makes the module suitable for applications in the harsh environment of mobile equipment with on-board battery power. All setpoints are user configurable using the Axiomatic Electronic Assistant.

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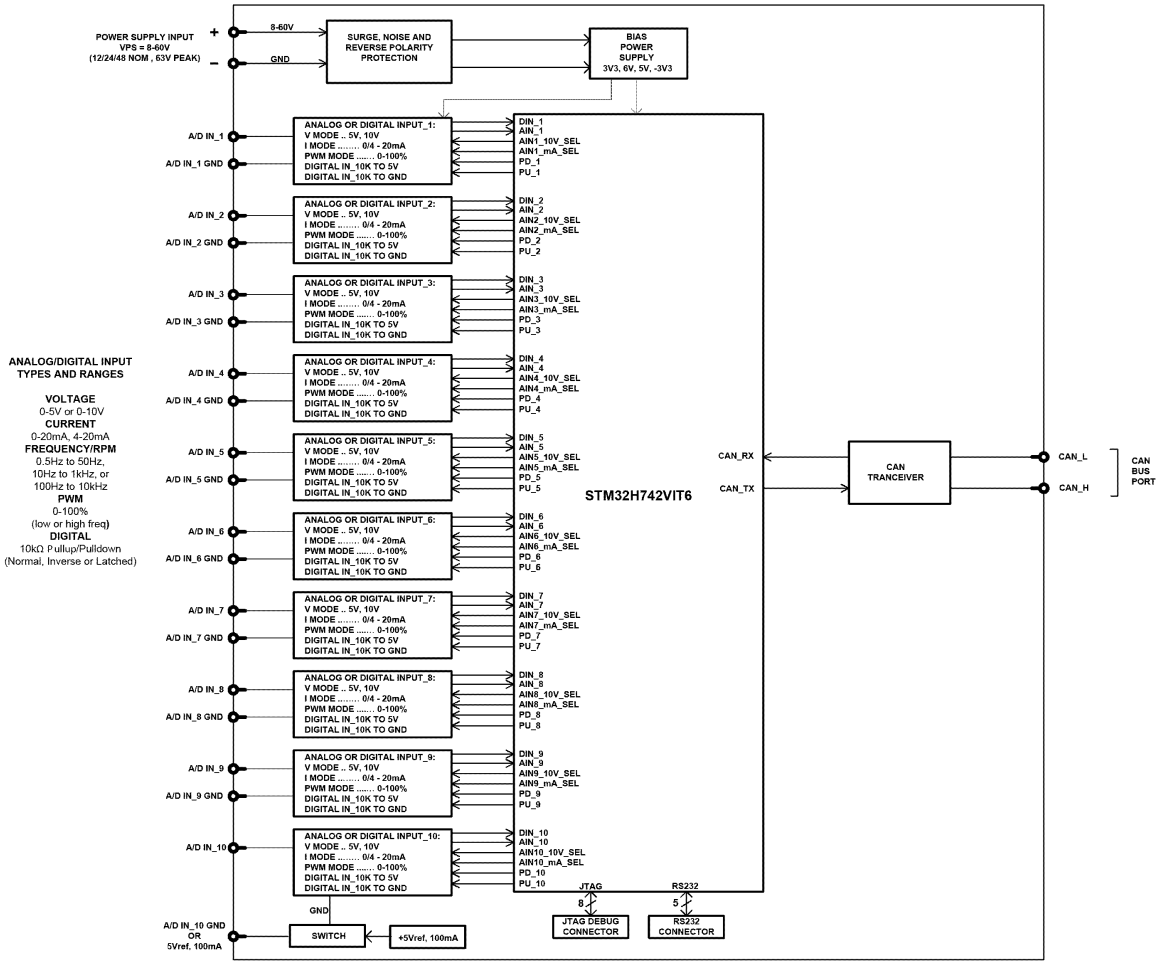
Block Diagram



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 Limitations & Return Materials Process as described on https://www.axiomatic.com/service/.

Power

Power Supply Input	12, 24, or 48 VDC nominal operating voltage 8 to 60 VDC power supply range for voltage transients
Quiescent Current	69.8 mA @12 V; 37.6 mA @ 24 V; 29 mA @ 48 V (typical)
Surge and Transient Protection	Provided
Reverse Polarity Protection	Provided
Undervoltage Protection	Provided. Hardware shutdown at 5.7 V
Overvoltage Protection	Provided. Hardware shutdown at 62.5 V
Reference Voltage	5 V, 100 mA ±2 %

Inputs

Signal Inputs

10 user selectable inputs (See Table 1.0.)

- Analog (0-1 V, 0-2.5 V, 0-5 V, 0-10 V, 0-20 mA, 4-20 mA)
- PWM, 0-100%
- Frequency
- Counter input 16-bit
- Digital 10 kΩ pull up/pull down (Normal, Inversed or Latched) (ON when input ≥ 2V)

The "Input Type" setpoint is used to configure input type.

Table 1.0. Inputs – Type Selections

Input Types	Value	Min Range	Max Range	Units
Input Not Implemented	0	-	-	-
Voltage Input 0 to 1 V	10	0	1	V
Voltage Input 0 to 2.5 V	11	0	2.5	V
Voltage Input 0 to 5 V	12	0	5	V
Voltage Input 0 to 10 V	13	0	10	V
Current Input 0 to 20 mA	20	0	20	mA
Current Input 4 to 20 mA	21	4	20	mA
Frequency Input	40	0	10 000	Hz
PWM Duty Cycle Input	50	0	100	%
Digital Input Normal Logic	60	0	1	-
Digital Input Inverse Logic	61	0	1	-
Digital Input Latched Logic	62	0	1	-
Counter Input Window Measure	70	0	250 000	Pulses
Counter Input Timed Pulses	71	0	250 000	Pulses
Counter Input Trigger Pulses	72	0	1	Pulses

All inputs except for 16-bit Counter are sampled every 1ms.
Analog Input types have a 12-bit resolution.
Maximum input voltage is 43 V, and all inputs are protected from short circuit to +Vps.
Maximum input current is 50 mA, protected by resettable fuse.

Minimum and Maximum Ratings

Table 2.0. Absolute Maximum and Minimum Ratings

Characteristic	Min	Max	Units
Power Supply	8	60	VDC
Voltage Input	0	12	VDC
Current Input[1]	0	21	mA
Current Input – Voltage Level	0	12	VDC
Digital Type Input – Voltage Level	0	43	VDC
PWM Duty Cycle	0	100	%
PWM (Frequency)	0	10 000	Hz
PWM Voltage pk - pk	0	12	VDC
Frequency	0	10 000	Hz

[1]If the current goes above 50mA, a resettable fuse will stop the input from functioning.

Input Accuracy

Table 3.0. Input Accuracy

Input Type	Accuracy	Resolution
Voltage	±1 %	1 mV
Current	±1 %	1 µA
PWM	±1 %	0.1 %
Frequency	±1 %	1 Hz

Input Impedance

0-5 V: 1 MΩ
0-10 V: 170 kΩ
0-20 mA or 4-20 mA: 249 Ω
Frequency/Digital Input: Pull Up/Pull Down 10 kΩ

Scan Rate

Each input is scanned in 100 µs.
A complete scan of 10 inputs occurs with new measured values every 1 ms.

Analog Grounds

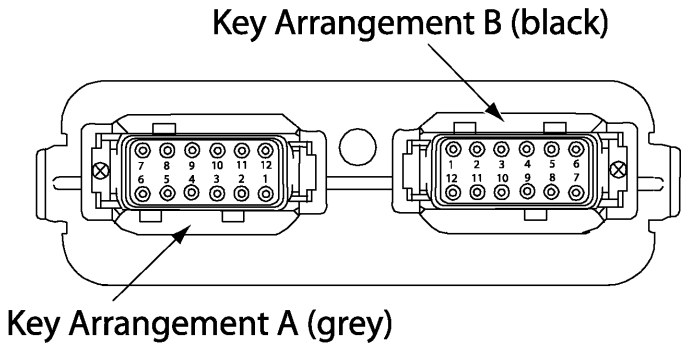
10 Analog Ground connections are provided.
Grounds are connected internally.

General Specifications

Microcontroller	STM32H742VIT6
Control Logic	Refer to the User Manual UMAX030120A for details on the standard embedded control logic. *For application-specific control logic, contact Axiomatic.* Summary: Configurable properties of the controller are divided into function blocks, namely input function block, diagnostic function block; lookup table function block, programmable logic function block, math function block, CAN receive message function block and CAN transmit message function block. Input function block includes properties used to select input sensor functionality. Diagnostic function block properties are used to configure fault detection and reaction functionalities. The Math function block gives user an opportunity to process inputs with basic mathematical of logical functions. The CAN transmit message function block configures properties of the messages sent to the CAN bus. The software was designed to provide flexibility to the user with respect to messages sent from the module (ECU) over the CAN bus, by providing: • Configurable ECU Instance in the NAME (to allow multiple ECUs on the same network) • Configurable Input Parameters • Configurable PGN and Data Parameters • Configurable Diagnostic Messaging Parameters, as required • Diagnostic Log, maintained in non-volatile memory The CAN Transmit function block is used to send any output from another function block (i.e., input, math) to the J1939 network. The AX030120A ECU has ten CAN Transmit Messages and each message has 4 signals. The "**Transmit PGN**" setpoint sets PGN used with the message. The user should be familiar with the SAE J1939 standard and select values for PGN/SPN combinations as appropriate from section J1939/71. By default, all messages are sent on Proprietary B PGNs as broadcast messages. None of the application layer PGNs are supported as part of the default configurations, but they can be selected as desired for transmit function blocks. Setpoints are accessed using standard Memory Access Protocol (MAP) with proprietary addresses. The Axiomatic Electronic Assistant (EA) allows for quick and easy configuration of the unit over CAN network.
Communications	1 CAN port (2.0B, SAE J1939) 250 kbit/s, 500 kbit/s, 667 kbit/s, 1 Mbit/s with auto-baud-rate detection A CANopen® model is available (P/N: AX030121A).
Network Termination	It is necessary to terminate the network with external termination resistors. The resistors are 120 Ω, 0.25 W minimum, metal film or similar type. They should be placed between CAN High and CAN Low terminals at both ends of the network.
User Interface	User configuration and diagnostics are provided with the Axiomatic Electronic Assistant - P/N: **AX070502** or **AX070506K**.
Reflashing	The device can be upgraded with new application firmware over the CAN bus using the Axiomatic Electronic Assistant.
Compliance	ISO 13766-1:2018 (CE / UKCA marking) RoHS
Protection	IP67, Unit is conformal coated in its enclosure.
Operating Temperature	-40 to 85 °C (-40 to 185 °F)
Storage Temperature	-50 to 125 °C (-58 to 257 °F)
Vibration	MIL-STD-202H, method 204, test condition C 10 g peak (Sine) MIL-STD-202H, method 214A, test condition I/B 7.56 Grms (Random)
Shock	MIL-STD-202H, method 213B, test condition A 50 g peak

Enclosure and Dimensions	High Temperature Nylon Enclosure – (TE Deutsch P/N: EEC-325X4B) Flammability Rating: UL 94V-0 4.63 in. x 5.24 in. x 1.417 in. (118.80 mm x 133.00 mm x 36.00 mm) (W x L x H excluding mating plugs)
Weight	0.55 lb. (0.25 kg)
Electrical Connections	24-pin receptacle (TE Deutsch P/N: DTM13-12PA-12PB-R008)
Mating Plug Kit	**PL-DTM06-12SA-12SB** Mating Plug Kit (includes TE Deutsch P/Ns 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.
Mounting	Mounting holes sized for ¼ in. or M6 bolts. The bolt length will be determined by the end-user's mounting plate thickness. The mounting flange of the controller is 0.63 in. (16 mm) thick. If the module is mounted without an enclosure, it should be mounted vertically with connectors facing left and 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. 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 in. or 15 cm) and strain relief (12 in. or 30 cm).

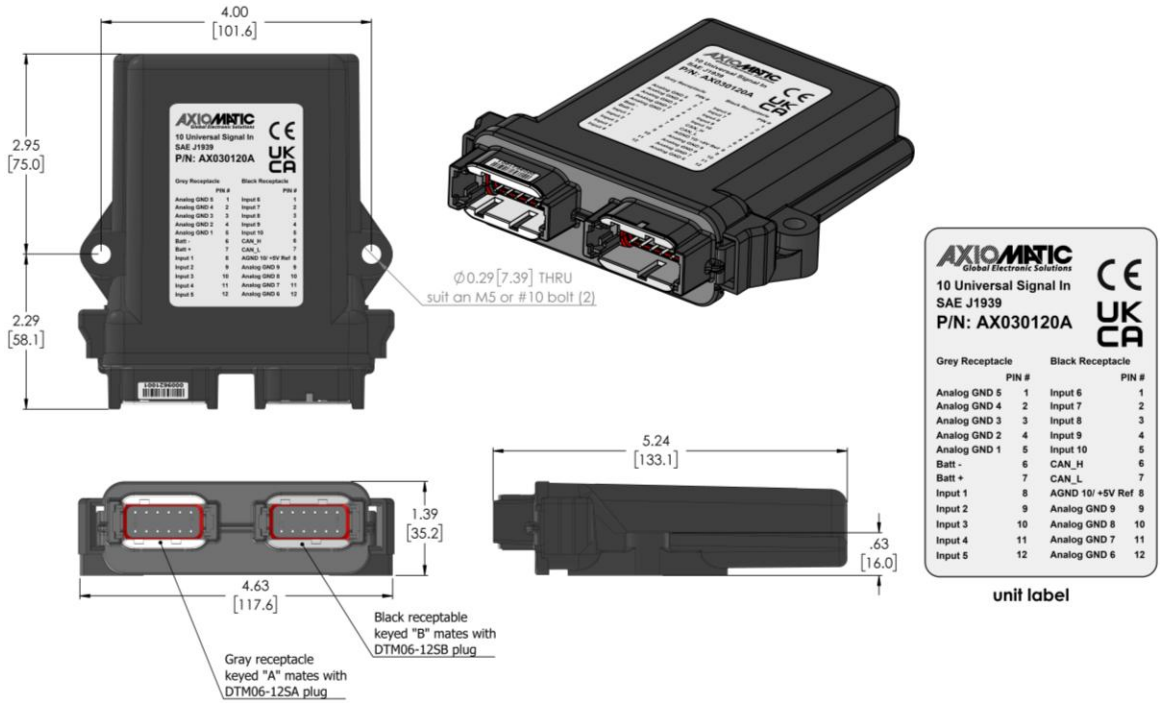
Electrical Connections



FRONT VIEW 24 PIN RECEPTACLE

Electrical Pin Out (24-pin TE Deutsch connector - P/N: DTM13-12PA-12PB-R008)			
Grey Connector		**Black Connector**	
Pin #	**Function**	**Pin #**	**Function**
1	Analog Ground 5	1	Input 6
2	Analog Ground 4	2	Input 7
3	Analog Ground 3	3	Input 8
4	Analog Ground 2	4	Input 9
5	Analog Ground 1	5	Input 10
6	Battery -	6	CAN High
7	Battery +	7	CAN Low
8	Input 1	8	Analog Ground 10 or 5 V Reference
9	Input 2	9	Analog Ground 9
10	Input 3	10	Analog Ground 8
11	Input 4	11	Analog Ground 7
12	Input 5	12	Analog Ground 6

Dimensional Drawing



unit label

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

Form: TDAX030120A – 02/27/2026