10 Universal Signal Inputs CAN Controller

V, mA, Digital, PWM, Hz/RPM, Counter Inputs
CANopen®

P/N: AX030121

Features:

- 10 user selectable signal inputs:
  - o 0-5 V
  - o 0-10 V
  - o 0-20 mA
  - o 4-20 mA
  - o PWM (low or high frequency)
  - o Frequency/RPM
  - o Counter
  - o Digital
- 12V, 24Vdc (nominal) power input
- 1 CAN port (CANopen®) (SAE J1939 in P/N AX030120)
- CE/UKCA mark (EMC Compliance)
- Rugged housing and connectors (TE Deutsch equivalents)
- Standard control logic
- .EDS provided to interface to standard CANopen® tools

Description: The 10 Universal Signal Inputs Controller accepts up to 10 analog or digital type inputs (0-5V, 0-10V, 0-20 mA, 4-20 mA, Digital, PWM, Frequency/RPM or Counter). The modules can be connected to a variety of analog machine sensors or levers, PLC's, switches, PWM signals, etc. It interfaces with the machine's CAN network (SAE J1939). Standard embedded software is provided. The module's rugged IP67 rated enclosure and its wide-ranging power supply input section for 12V or 24Vdc power makes it suitable for applications in the harsh environment of mobile equipment with on-board battery power. All setpoints are user configurable using commercially available CANopen® tools.
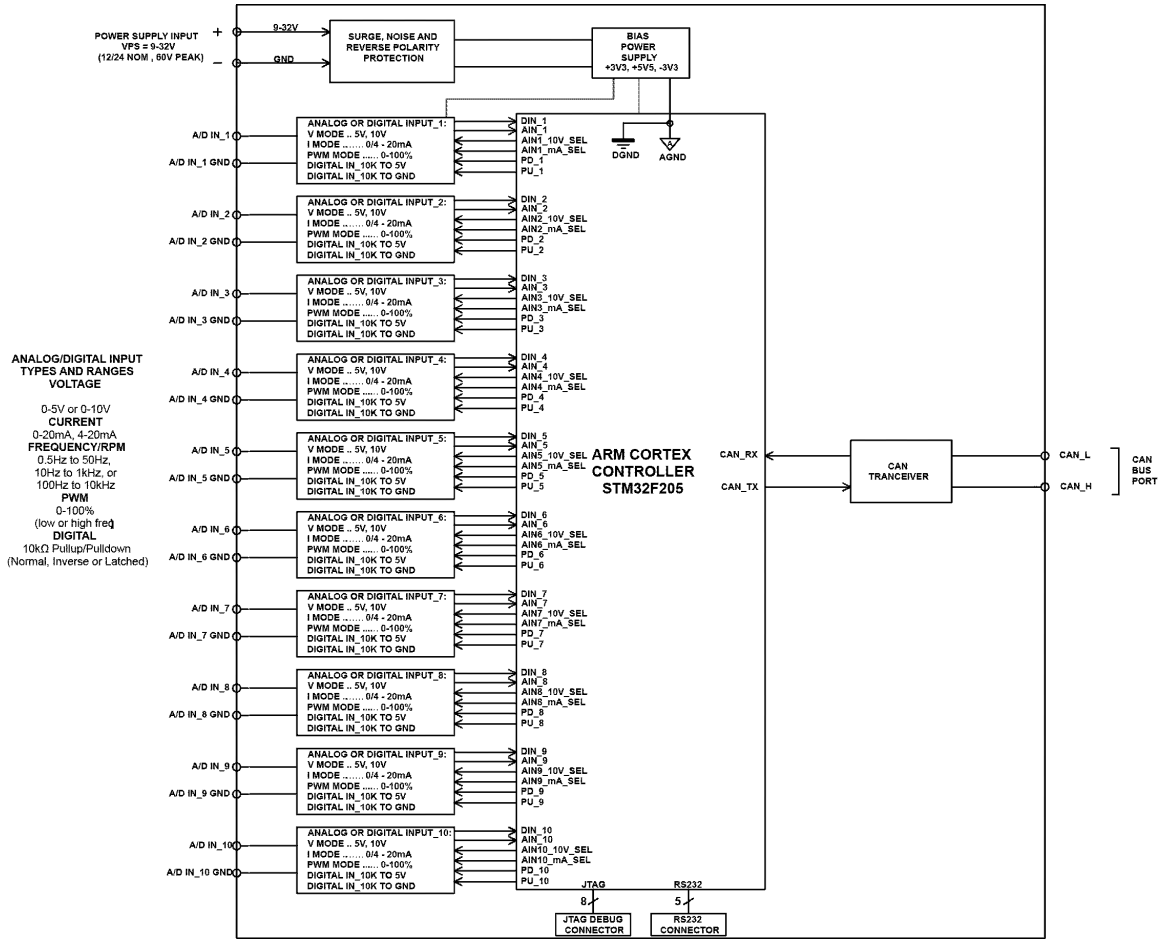
Applications:

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:

CANopen® version
Controller: **AX030121** EDS File: **EDS-AX030121**
Accessories: **PL-DTM06-12SA-12SB** Mating Plug Kit (1 DTM06-12S, DTM06-12SB, 2 W12S, 24 contacts)

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/.

Power Input Specifications

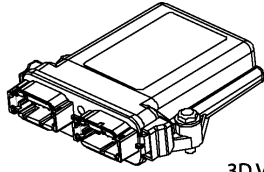|	
Power Supply Input - Nominal	12 or 24Vdc nominal operating voltage 8…60 Vdc power supply range for voltage transients
Surge Protection	Provided
Reverse Polarity Protection	Provided
Quiescent Current	< 25mA @ Vin = 24V

Signal Input Specifications

Inputs	10 user selectable inputs • Analog 12-bit (0-5V, 0-10V, 0-20 mA, 4-20 mA) • PWM 12-bit (low or high frequency) • Frequency/RPM • Counter input 16-bit • Digital (active high/active low) [ON when input $\geq$ 1.5V] All inputs with the exception of 16-Bit Counter are sampled every 1ms. Analog Input types have a 12-bit resolution. With current inputs, short circuit protection is provided.
Minimum and Maximum Ratings	**Table 2.0. Absolute Maximum and Minimum Ratings** _(see table below)_
Input Accuracy	**Table 3.0. Input Accuracy** _(see table below)_
Input Impedance	0-5V: 1 MOhm 0-10V: 170 kOhm 0(4)-20mA: 249 Ohm Frequency/Digital Input: Pull Up/Pull Down 22 KOhm
Analog GND	10 Analog GND connections are provided. Grounds are connected internally.

Table 2.0. Absolute Maximum and Minimum Ratings

Characteristic	Min	Max	Units
Power Supply	8	60	V dc
Voltage Input	0	43	V dc
Current Input[1]	0	20	mA
Digital Type Input – Voltage Level	0	43	Vdc
PWM Duty Cycle	0	100	%
PWM Frequency	50	10 000	Hz
PWM Voltage pk - pk	0	43	V dc
RPM Frequency	50	10 000	Hz

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

Table 3.0. Input Accuracy

Input Type	Accuracy	Resolution
Voltage	+/- 1%	1 [mV]
Current	+/- 1%	2.5 [uA]
PWM	+/- 1% (<5kHz) +/- 2% (>5kHz)	0.1 [%]
Frequency/RPM	+/- 1%	0.01 [Hz]

General Specifications

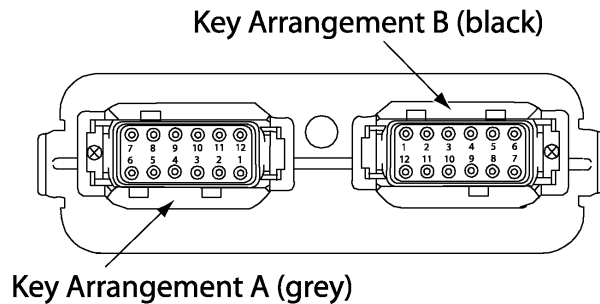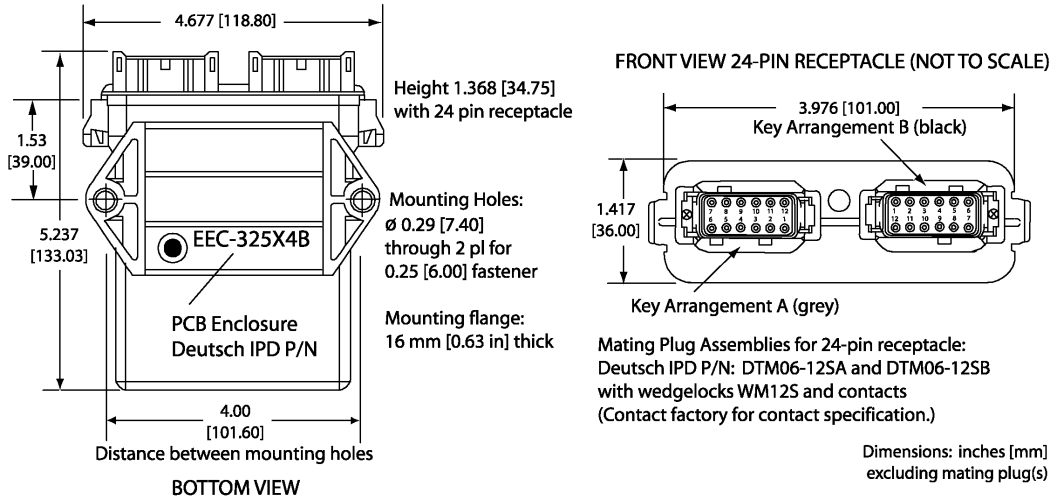|	
Microcontroller	STM32F205VGT6
EMC Compliance	CE/UKCA marks
Communications	1 CAN 2.0B port, protocol CiA CANopen® By default, the 10 Universal Signal Inputs Controller transmits measured input (FV object 7100h) TPDO1, TPDO2, and TPDO3. A SAE J1939 model is available (P/N AX030120). An on-board RS-232 port is used for factory programming only. 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 AX030121 is compliant with the following CAN in Automation (CiA) standards.<table><tr><td>[DS-301]</td><td>CiA DS-301 V4.1 – CANopen® Application Layer and Communication Profile. CAN in Automation 2005</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>
CAN Response Time	The maximum recommended transmit rate for any TPDO is 10ms. Response time of feedback on the CAN to changes at the I/O will be a combination of the I/O type's response time and the configurable software filtering, delays, etc.
Node-ID and Baud Rate	Configurable using Layer Setting Services Default Node-ID = 127 and Baud Rate = 125 kbps.
User Interface	EDS File is provided. The controller architecture consists of a set of internal functional blocks, which can be individually programmed and arbitrarily connected together to achieve the required system functionality for a specific application. All objects are user configurable using standard commercially available tools 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 should be placed between CAN_H and CAN_L terminals at both ends of the network.
Control Logic	Refer to User Manual UMAX030121 for details. *For application-specific control logic, contact Axiomatic.*
Diagnostics	The module can detect the following. • Module Over-Temperature • Power Supply Over Voltage • Power Supply Under Voltage
Electrical Connections	24-pin receptacle (equivalent TE Deutsch P/N : DTM13-12PA-12PB-R008) Mating plug: equivalent 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.
Enclosure and Dimensions	High Temperature Nylon Enclosure – (equivalent TE Deutsch P/N: EEC-325X4B) Flammability Rating: UL 94V-0 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 Temperature	-40 to 85°C (-40 to 185°F)
Storage Temperature	-50 to 125°C (-58 to 257°F)
Weight	0.55 lb. (0.25 kg)
Protection	IP67, Unit is conformal coated in its enclosure.
Vibration	MIL-STD-202G, Method 204D, test condition A – 10 g peak (Sine) MIL-STD-202G, Method 214A, test condition B – 7.68 Grms (Random)
Shock	MIL-STD-202G, Method 213B, test condition A 50 g half sine pulse, 6 ms, 6 pulses per axis

Dimensions and Connections:

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

Mounting flange:
16 mm [0.63 in] thick

PCB Enclosure
Deutsch IPD P/N

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)

Key Arrangement B (black)

Key Arrangement A (grey)

FRONT VIEW 24 PIN RECEPTACLE

Table 5.0. Electrical Pin Out			
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

CANopen® is a registered community trademark of CAN in Automation e.V.   Form: TDAX030121-10/10/23