TECHNICAL DATASHEET #TDAX030141

3 Encoder, 7 Signal Inputs CAN Controller

3 Encoder, 1 Universal Signal, 6 Digital/PWM/Hz Inputs
CANopen®

P/N: AX030141

Features:

- 1 user selectable universal signal input:
  - 0-5 V
  - 0-10 V
  - 0-20 mA
  - 4-20 mA
  - PWM (low or high frequency)
  - Frequency/RPM
  - Counter
  - Digital
- 4 user selectable digital signal inputs:
  - PWM (low or high frequency)
  - Frequency/RPM
  - Digital
- 2 digital inputs
- 3 encoder inputs (A and B signal)
- 3-way isolation between inputs, power and CAN
- 12V, 24V, 48 Vdc (nominal) power input
- CANopen®
- Rugged enclosure and connectors (TE Deutsch equivalents)
- Standard control logic
- CE/UKCA mark (EMC Directive)

Description: The 3 Encoder, 7 Signal Input Module accepts up to 3 encoders; 1 analog or digital type signal inputs (0-5V, 0-10V, 0-20 mA or 4-20 mA, Digital, PWM, Frequency/RPM or Counter); 4 digital type signal inputs (Digital, PWM, Frequency/RPM) and 2 Digital inputs. 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 (CANopen®). Standard embedded software is provided. A rugged IP67 rated enclosure and a wide-ranging power supply input section for 12V, 24V or 48Vdc power makes the module suitable for applications in the harsh environment of mobile equipment with on-board battery power. All setpoints are user configurable.

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

Ordering Part Numbers:

Model P/N	*Fieldbus*
AX030141	CANopen®

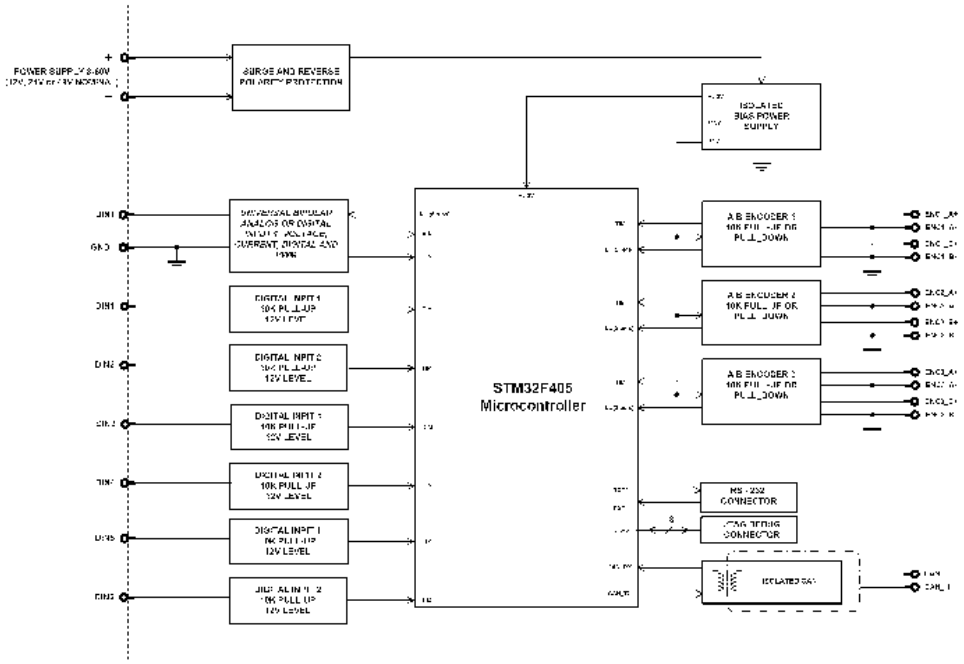
Accessories:
PL-DTM06-12SA-12SB Mating Plug Kit (1 DTM06-12S, DTM06-12SB, 2 WM12S, 24 contacts)

EDS File

Axiomatic Technologies Oy
Höytämöntie 6
33880 LEMPÄÄLÄ, Finland
Tel. +358 103 375 750
salesfinland@axiomatic.com
www.axiomatic.fi

Axiomatic Technologies Corporation
1445 Courtneypark Dr. E.
Mississauga, ON Canada L5T 2E3
Tel. 1 905 602 9270
sales@axiomatic.com
www.axiomatic.com

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, 24 or 48Vdc nominal operating voltage 8…60 Vdc power supply range for voltage transients
Surge Protection	Provided
Reverse Polarity Protection	Provided
Quiescent Current	55 mA @ 12Vdc; 28 mA @ 24Vdc Typical

Signal Input Specifications

Encoder Inputs	Three 2-phase, phase A and B incremental encoder inputs Range: 0.5 to 60 kHz (preliminary) Amplitude: up to +Vps 1 MOhm impedance or Active High with 10K Pullup or Active Low with 10K Pulldown resistor to GND

<table>
<tr><td>Universal Input</td><td>1 user selectable input
Analog 12-bit (0-5V, 0-10V, 0-20 mA, 4-20 mA)
PWM 12-bit (low or high frequency) – auto detect 0.5 to 50 kHz, 0-100%
Frequency/RPM – auto detect 0.5 to 50 kHz, 0-100%
Counter input 16-bit
Digital (active high/active low) [ON when input ≥ 1.5V]
The “Input Sensor Type” setpoint is used to configure input type.
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.</td></tr>
<tr><td>Digital Inputs 1-6</td><td>4 user selectable inputs
PWM 12-bit (low or high frequency)
Frequency/RPM auto detect 0.5 to 50 kHz, 0-100%
Digital (active high with 10K pullup) [ON when input ≥ 1.5V]
2 digital inputs (inputs 3 and 6)
Digital (active high with 10K pullup) [ON when input ≥ 1.5V]</td></tr>
<tr><td>Minimum and Maximum Ratings</td><td>Table 1.0. Absolute Maximum and Minimum Ratings<table><tr><th>Characteristic</th><th>Min</th><th>Max</th><th>Units</th></tr><tr><td>Power Supply</td><td>8</td><td>60</td><td>V dc</td></tr><tr><td>Voltage Input</td><td>0</td><td>43</td><td>V dc</td></tr><tr><td>Current Input</td><td>0</td><td>21</td><td>mA</td></tr><tr><td>Current Input – Voltage Level</td><td>0</td><td>12</td><td>Vdc</td></tr><tr><td>Digital Type Input – Voltage Level</td><td>0</td><td>43</td><td>Vdc</td></tr><tr><td>PWM Duty Cycle</td><td>0</td><td>100</td><td>%</td></tr><tr><td>PWM Frequency</td><td>50</td><td>20 000</td><td>Hz</td></tr><tr><td>PWM Voltage pk - pk</td><td>0</td><td>43</td><td>V dc</td></tr><tr><td>RPM Frequency</td><td>50</td><td>20 000</td><td>Hz</td></tr></table></td></tr>
<tr><td>Input Accuracy</td><td>Table 2.0. Input Accuracy<table><tr><th>Input Type</th><th>Accuracy</th><th>Resolution</th></tr><tr><td>Voltage</td><td>+/- 1%</td><td>1 [mV]</td></tr><tr><td>Current</td><td>+/- 1%</td><td>1 [uA]</td></tr><tr><td>PWM</td><td>+/- 1% (<5kHz)
+/- 2% (>5kHz)</td><td>0.1 [%]</td></tr><tr><td>Frequency/RPM</td><td>+/- 1%</td><td>0.01 [Hz]</td></tr></table></td></tr>
<tr><td>Input Impedance</td><td>0-5V: 1 MOhm
0-10V: 170 kOhm
0(4)-20mA: 249 Ohm
Frequency/Digital Input: Pull Up/Pull Down 1 MOhm</td></tr>
<tr><td>Scan Rate</td><td>Each input is scanned in 100uS.
A complete scan of 10 inputs occurs with new measured values every 1mS.</td></tr>
<tr><td>Analog GND</td><td>1 Analog GND connections is provided.</td></tr>
</table>

General Specifications

Microcontroller	STM32F405RG
Isolation	3-way isolation between inputs, power and CAN 400 Vrms
Communications	1 CAN port (CANopen®) A SAE J1939 model is available, ordering part number AX030140. Auto baud rate detection allows for high speed SAE J1939 CAN bus connections.
EMC Compliance	CE/UKCA marking
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
User Interface	User configuration and diagnostics are provided by any CANopen® service tool (not supplied).
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 the User Manual UMAX030141 for details. The AX030141 can be upgraded with new application firmware over the CAN bus using the Axiomatic Electronic Assistant. *For application-specific control logic, contact Axiomatic.*
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. Refer to Table 3.0 for pinout.
Enclosure and Dimensions	High Temperature Nylon Enclosure – (TE Deutsch P/N: EEC-325X4B) Flammability Rating: UL 94V-0 4.63 x 5.25 x 1.41 inches 117.60 x 133.50 x 35.90 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 the housing.
Mounting	Mounting holes sized for ¼ inch 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 inches (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 always be in conduit or conduit trays. 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 inches or 15 cm) and strain relief (12 inches or 30 cm).

Dimensions and Typical Connections:

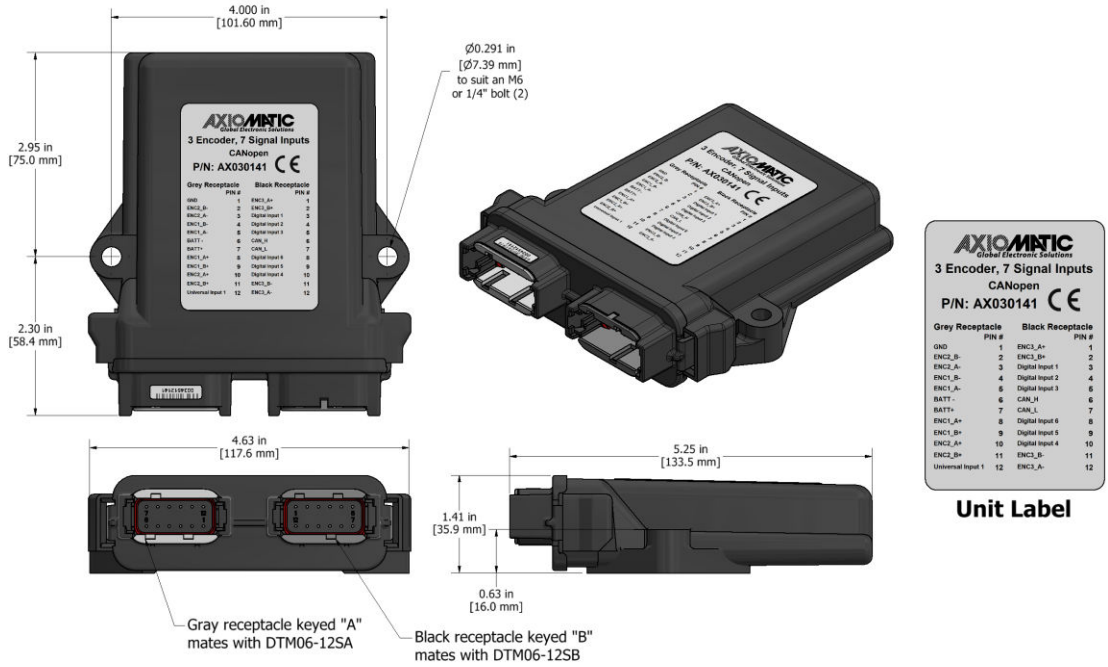


Table 3.0. Electrical Pin Out			
Grey Connector		**Black Connector**	
Pin #	**Function**	**Pin #**	**Function**
1	Analog GND	1	ENC3_A+
2	ENC2_B-	2	ENC3_B+
3	ENC2_A-	3	Digital Input 1
4	ENC1_B-	4	Digital Input 2
5	ENC1_A-	5	Digital Input 3 (Digital only)
6	Batt -	6	CAN_H
7	Batt +	7	CAN_L
8	ENC1_A+	8	Digital Input 6 (Digital only)
9	ENC1_B+	9	Digital Input 5
10	ENC2_A+	10	Digital Input 4
11	ENC2_B+	11	ENC3_B-
12	Universal Input	12	ENC3_A-

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

Form: TDAX030141-05/31/23