

10 Universal Signal Inputs CAN Controller

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

P/N: AX030121

Features:

- 10 user selectable signal inputs:
 - 0-5 V
 - 0-10 V
 - 0-20 mA
 - 4-20 mA
 - PWM (low or high frequency)
 - Frequency/RPM
 - Counter
 - 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.

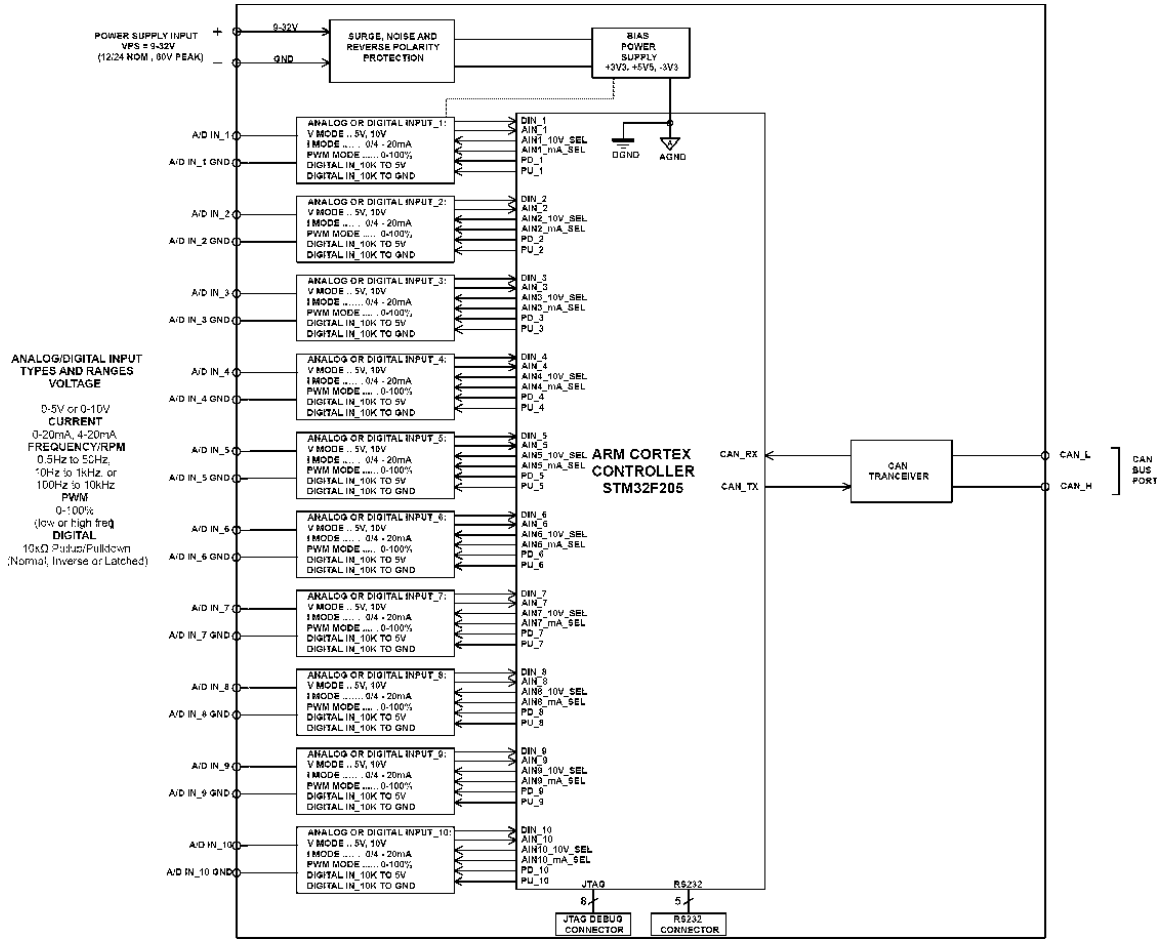
Applications:

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:

| |
|--|
| <i>CANopen® version</i> |
| 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 |

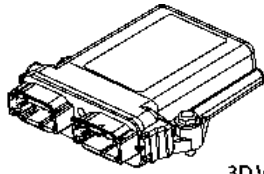
Signal Input Specifications

| Inputs | <p>10 user selectable inputs</p> <ul style="list-style-type: none"> 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] <p>All inputs with the exception of 16-Bit Counter are sampled every 1ms. Analog Input types have a 12-bit resolution.</p> <p>With current inputs, short circuit protection is provided.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|---|-------|--|------------|----------------|------------|---------|--------|--------------|---------|--------|----------|---------------|----------------------------------|---------|---------------|----------------------------|-----------|----|----|------------------------------------|---|----|-----|----------------|---|-----|---|---------------|----|--------|----|---------------------|---|----|------|---------------|----|--------|----|
| Minimum and Maximum Ratings | <table border="1"> <thead> <tr> <th colspan="4">Table 2.0. Absolute Maximum and Minimum Ratings</th> </tr> <tr> <th>Characteristic</th> <th>Min</th> <th>Max</th> <th>Units</th> </tr> </thead> <tbody> <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 Input¹</td> <td>0</td> <td>20</td> <td>mA</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>10 000</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>10 000</td> <td>Hz</td> </tr> </tbody> </table> <p>¹If the current goes above 50mA, a resettable fuse will stop the input from functioning.</p> | 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 |
| 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Input Accuracy | <table border="1"> <thead> <tr> <th colspan="3">Table 3.0. Input Accuracy</th> </tr> <tr> <th>Input Type</th> <th>Accuracy</th> <th>Resolution</th> </tr> </thead> <tbody> <tr> <td>Voltage</td> <td>+/- 1%</td> <td>1 [mV]</td> </tr> <tr> <td>Current</td> <td>+/- 1%</td> <td>2.5 [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> </tbody> </table> | 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] | | | | | | | | | | | | | | | | | | | | | | |
| 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] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Input Impedance | <p>0-5V: 1 MOhm 0-10V: 170 kOhm 0(4)-20mA: 249 Ohm Frequency/Digital Input: Pull Up/Pull Down 22 KOhm</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Analog GND | <p>10 Analog GND connections are provided. Grounds are connected internally.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

General Specifications

| | | | | | | | |
|--------------------------|---|----------|--|----------|--|----------|---|
| Microcontroller | STM32F205VGT6 | | | | | | |
| EMC Compliance | CE/UKCA marks | | | | | | |
| Communications | <p>1 CAN 2.0B port, protocol CiA CANopen®</p> <p>By default, the 10 Universal Signal Inputs Controller transmits measured input (FV object 7100h) TPDO1, TPDO2, and TPDO3.</p> <p>A SAE J1939 model is available (P/N AX030120).</p> <p>An on-board RS-232 port is used for factory programming only.</p> <p>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.</p> <p>The Axiomatic AX030121 is compliant with the following CAN in Automation (CiA) standards.</p> <table border="1"> <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> | [DS-301] | CiA DS-301 V4.1 – CANopen® Application Layer and Communication Profile. CAN in Automation 2005 | [DS-404] | CiA DS-404 V1.2 – Device Profile for Measurement Devices and Closed-Loop Controllers. CAN in Automation 2002 | [DS-305] | CiA DS-305 V2.0 – Layer Setting Service (LSS) and Protocols. CAN in Automation 2006 |
| [DS-301] | CiA DS-301 V4.1 – CANopen® Application Layer and Communication Profile. CAN in Automation 2005 | | | | | | |
| [DS-404] | CiA DS-404 V1.2 – Device Profile for Measurement Devices and Closed-Loop Controllers. CAN in Automation 2002 | | | | | | |
| [DS-305] | CiA DS-305 V2.0 – Layer Setting Service (LSS) and Protocols. CAN in Automation 2006 | | | | | | |
| 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. <i>For application-specific control logic, contact Axiomatic.</i> | | | | | | |
| Diagnostics | The module can detect the following. <ul style="list-style-type: none"> • 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 | | | | | | |

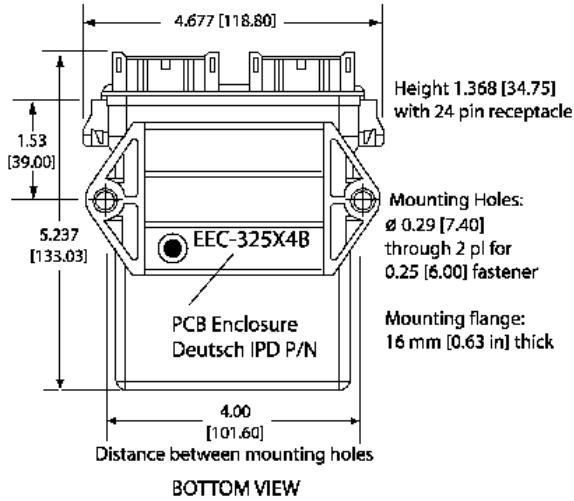
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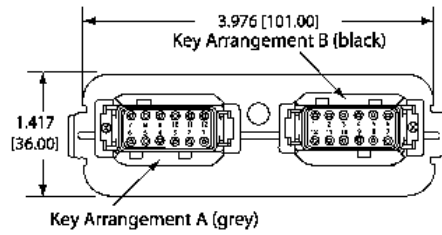
3D VIEW
Housing with 24 Pin Receptacle

HOUSING DIMENSIONS

Housing Material: High Temperature Nylon (Black)



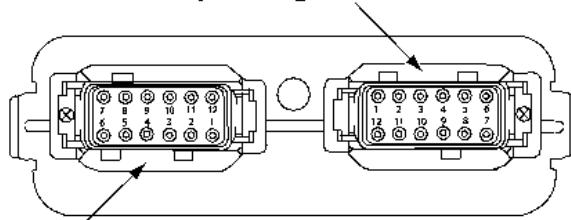
FRONT VIEW 24-PIN RECEPTACLE (NOT TO SCALE)



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

| 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 |