

**TECHNICAL DATASHEET #TDAX189001**  
**Thermocouple Module, 1 Channel**  
**P/N: AX189001**

***Monitors 1 Type J, K, B, E, N, R, S or T Thermocouples***  
***2 Universal Signal Inputs***  
***2 CAN (CANopen®)***

**Description:**

Two universal signal inputs are configurable as: Voltage, Current, PWM, Digital or Resistive (for Input 1 only). The Thermocouple Module monitors 1 channel of Type J, K, B, E, N, R, S or T thermocouples (others on request). The temperature information is provided to the engine control system over CANopen®. Temperature information can include exhaust temperature, winding temperature, and fluid temperature monitoring. All channels are fully isolated and measure temperatures at the same time. Temperature data is automatically sent over the CAN bus when power is applied. The input is isolated. Integral diagnostics can flag open wire fault detection. CAN communications are via an isolated CANopen®. Settings are automatically saved to non-volatile memory. The product enclosure is rated as IP67 and has a 12 pin Deutsch style connector.



**Applications:**

- Applications include power generator sets.
- Machine engine monitoring systems

**Features:**

- 2 Universal signal inputs configurable as: Voltage, Current, PWM, Digital or Resistive (for Input 1 only).
- Reads 1 Type J, K, B, E, N, R, S or T thermocouple input (other thermocouple types on request)
- TC input channel configured for CANopen® SPN to transmit the temperature measured by that input
- User defined SPN configurability
- Cold junction compensation is provided.
- Thermocouple input resolution is 0.1 °C.
- Accuracy is +/- 1 °C throughout the entire range of the thermocouple input.
- Full channel to channel isolation and isolation from CAN line, TC input and power supply
- 2 CANopen® ports
- Robust 9...60Vdc power supply, 12V, 24V or 48Vdc nominal, with reverse polarity protection
- Compact size for mounting directly on the power generator set or remotely
- Rugged IP67 rated packaging with 12 pin plug-in connection
- Operational from -40 to 70°C (-40 to 158°F)
- **EDS File**
- Configuration files can be saved and written to other same devices during setup.

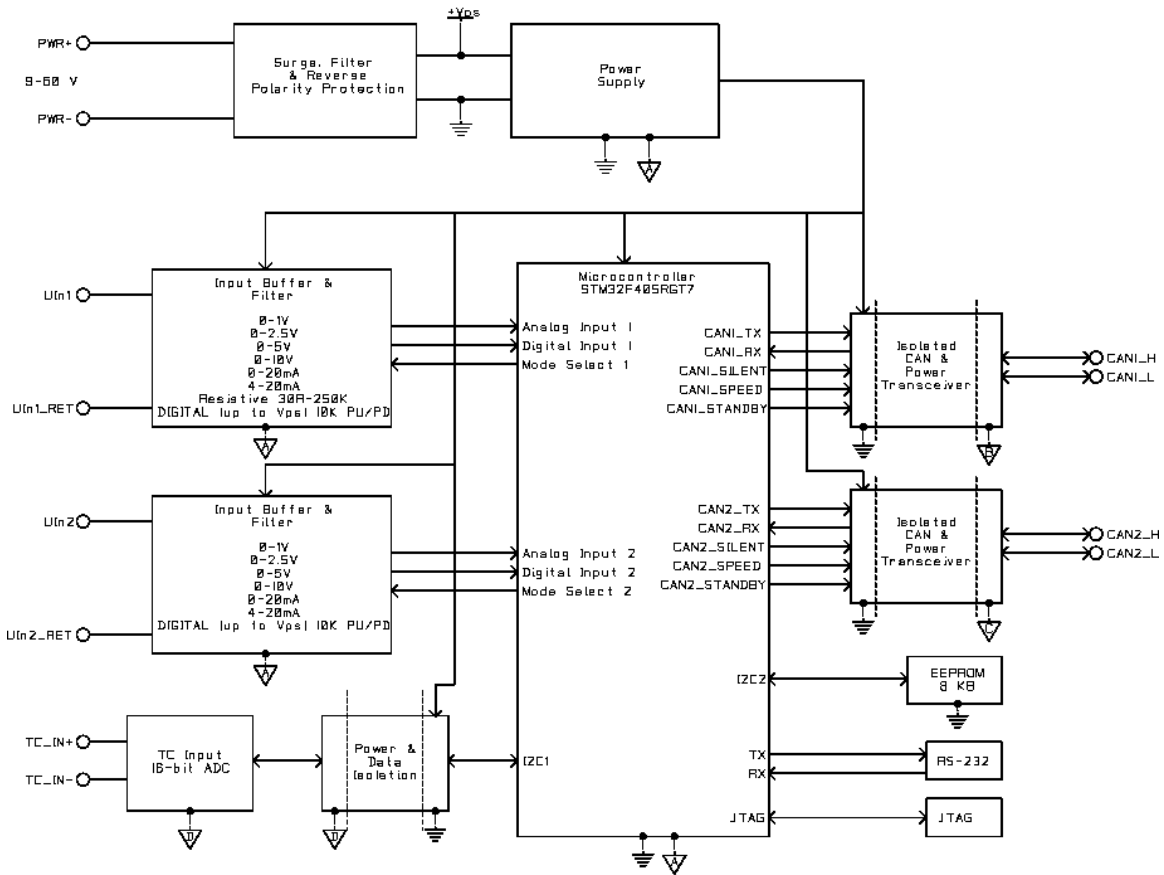
**Ordering Part Numbers:**

Thermocouple Module, 1 TC, 2 Universal Signal, 2 CANopen®: **AX189001**

**Accessories:**

**PL-DTM06-12SA** Mating Plug Kit :1 DTM06-12SA, 1 WM-12S, 12 0462-201-20141, 6 0413-204-2005  
Sealing Plug

## Block Diagram



## Technical Specifications:

### Power Supply:

Power Supply Input	12V, 24V or 48Vdc nominal (9...60Vdc power supply range)
Surge and Transients	Surge and transient protection up to 120 V is provided.
Reverse Polarity	Reverse polarity protection is provided up to 100V.
Under-voltage	Under-voltage protection is provided. Hardware shuts down at 5V.
Over-voltage	Over-voltage protection is provided. Hardware shuts down at 62 V.

### Input Specifications

Universal Inputs	2 Universal Signal Inputs configurable as: Voltage, Current, PWM, Digital or Resistive (for Input 1 only) Refer to Table 1.0.
TC Input	<p>One (1) Type J, K, B, E, N, R, S or T</p> <p>The device reads mV signals from the supported Thermocouples.</p> <p>B = 0 to 13.82 mV</p> <p>E = -9.835 to 76.373 mV</p> <p>J = -8.095 to 69.553 mV</p> <p>K = -6.458 to 54.886 mV</p> <p>N = -4.345 to 47.513 mV</p> <p>R = -0.226 to 21.101 mV</p> <p>S = -0.236 to 18.693 mV</p> <p>T = -6.258 to 20.872 mV</p> <p>(Other TC types are available on request.)</p>

Input Accuracy and Resolution	Input Type	Input Range	Accuracy	Resolution
	Voltage	0-1V, 0-2.5V, 0-5V, 0-10V	+/-1%	1 mV
	Current	0(4)-20mA	+/-1%	<12 $\mu$ A
	Resistive	30-250k $\Omega$	+/-2%	1 $\Omega$
	Frequency	1Hz-10kHz	+/-1%	0.01%
	PWM	Frequency	+/-1%	0.01%
Protection	All inputs are protected against short to GND. All inputs are protected against shorts to Nominal Vps (36Vdc).			
Ground	2 analog ground connections are provided.			

Table 1.0: Universal Inputs

Parameter	Value				
Universal Inputs	Two (2) Universal Signal Inputs are provided. Configurable as: Voltage, Current, PWM, Digital or Resistive (for Input 1 only)				
Analog Input Modes	Voltage, Current, Resistance 12-bit Analog to Digital				
Voltage Input	Input Range	Input Impedance	Resolution	Accuracy	
	0...1V	>1 MOhm (High Z) <sup>1</sup>	1 mV	+/- 1%	
	0...2.5V	>1 MOhm (High Z) <sup>1</sup>	1 mV	+/- 1%	
	0...5V	204 kOhm <sup>1</sup>	1 mV	+/- 1%	
	0...10V	136 kOhm <sup>1</sup>	1 mV	+/- 1%	
	<sup>1</sup> 10kOhm LoZ option is available.				
Current Input	Input Range	Input Impedance	Resolution	Accuracy	
	0...20mA	124Ohm	<12uA	+/- 1%	
	4...20mA				
Resistive Input	<b>The Resistive Input is only available on Universal Input 1.</b>				
	Input Range	Resolution	Accuracy		
	Auto Range 10...250kOhm <sup>1,2</sup>	—	—		
	30Ohm...250kOhm <sup>2</sup>	<0.15 Ohm	+/- 2%		
	<sup>1</sup> Resolution and accuracy depend on the automatically selected Input Range. <sup>2</sup> Resistance <10 Ohm is measured as 0.				
Analog Update Rate	1ms minimum <sup>1</sup> . <sup>1</sup> Depends on the analog filter settings. In resistive mode also depends on the number of resistive inputs.				
Digital Input Modes	Discrete Voltage Level, Frequency, PWM Duty Cycle				
Input Polarity	Active High up to 5.5V, Active Low to Ground				
Input Amplitude	0V to +Vps				
Input Impedance	>1MOhm – High Z, 10kOhm pull down, 10kOhm pull-up to +5.5V				
Input Level	5V CMOS Compatible. A direct connection to the power supply is acceptable.				
Discrete Voltage Level Input	1ms sampling rate				
Frequency Input	Input Number	Counter Resolution	Frequency Range	Resolution	Accuracy
	Universal Input #1...2	16-bit	100Hz...10kHz	<0.0015...0.15%	+/- 1%
			10Hz...1kHz		
			1Hz...100Hz		

Parameter	Value				
PWM Duty Cycle Input	Input Number	Counter Resolution	Frequency Range	Resolution	Accuracy
	Universal Input #1...2	16-bit	100Hz...10kHz	<0.0015...0.15%	+/- 1%
			10Hz...1kHz		+/- 1%
			1Hz...100Hz		+/- 1%
	0...100% Duty Cycle Range. DC is included.				
Protection	+36V maximum. Forward voltage only. No reverse polarity protection. Protected against shorts to GND or +Supply				

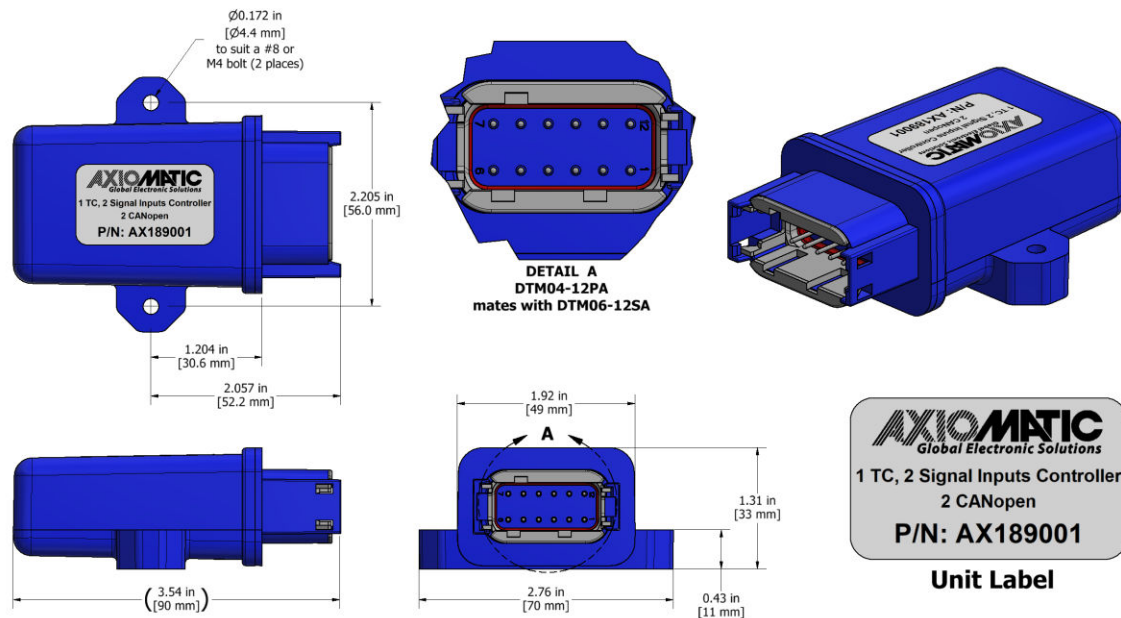
### Control Logic:

Software Platform	Pre-programmed with standard logic. Refer to the user manual. (Application-specific control logic is available on request.)
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### General Specifications:

Microprocessor	STM32F405RG, 32-bit, 1MByte flash memory																										
Quiescent Current	39mA at 24V, 76mA at 12V Typical																										
Isolation	Isolation of TC input channel and the CAN ports from the other inputs and power supply. 330 Vrms for the CAN port 445 Vrms for the TC input																										
CAN Interface	2 Isolated CAN ports CANopen®																										
Baud Rate	CAN Baud rate: 10, 20, 50, 100, <b>125</b> , 250, 500, 800 kbit/s, 1 Mbit/s. Default 125 kbit/s.																										
Protection for CAN port	CAN transceivers provide a 115 mA short circuit current limit																										
User Interface	EDS File Download from <a href="http://axiomatic.com">axiomatic.com</a> , log-in section. The password is available from <a href="mailto:sales@axiomatic.com">sales@axiomatic.com</a> .  Commercially available CANopen tools (not supplied)																										
Reflashing Software over CAN	Reflash software over the CAN bus per the SAE J1939 standard using the Electronic Assistant, AX070502.																										
Enclosure and Dimensions	Molded Enclosure, integral connector Nylon 6/6, 30% glass Ultrasonically welded 3.54 x 2.75 x 1.31 inches (90.09 x 70.00 x 33.35 mm) L x W x H including integral connector Refer to the dimensional drawing.																										
Electrical Connections	Integral Deutsch style 12 pin receptacle (P/N: DTM04-12PA) <table border="1"> <thead> <tr> <th>PIN #</th><th>FUNCTION</th></tr> </thead> <tbody> <tr><td>1</td><td>Universal Input 1 GND</td></tr> <tr><td>2</td><td>Universal Input 1</td></tr> <tr><td>3</td><td>Universal Input 2</td></tr> <tr><td>4</td><td>Universal Input 2 GND</td></tr> <tr><td>5</td><td>TC Input</td></tr> <tr><td>6</td><td>TC Input Return</td></tr> <tr><td>7</td><td>CAN 2_L</td></tr> <tr><td>8</td><td>CAN 2_H</td></tr> <tr><td>9</td><td>CAN 1_L</td></tr> <tr><td>10</td><td>CAN 1_H</td></tr> <tr><td>11</td><td>Power -</td></tr> <tr><td>12</td><td>Power +</td></tr> </tbody> </table>	PIN #	FUNCTION	1	Universal Input 1 GND	2	Universal Input 1	3	Universal Input 2	4	Universal Input 2 GND	5	TC Input	6	TC Input Return	7	CAN 2_L	8	CAN 2_H	9	CAN 1_L	10	CAN 1_H	11	Power -	12	Power +
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Mating Plug Kit	Mates to PL-DTM06-12SA (1 DTM06-12SA, 1 WM-12S, 10 0462-201-20141, 2 0413-204-2005 Sealing Plug)																										
Operating Conditions	-40 to 70°C (-40 to 158°F)																										
Weight	0.14 lb. (0.064 kg)																										

Protection	IP67; Unit is conformal coated within the housing.
Vibration	MIL-STD-202G, Test 204D and 214A (Sine and Random) 10 g peak (Sine); 7.65 Grms peak (Random)
Shock	MIL-STD-202G, Test 213B, 50 g
Mounting	<p>Mounting holes are sized for #8 or M4 bolts. The bolt length will be determined by the end-user's mounting plate thickness. The mounting flange of the controller is 0.425 inches (10.8 mm) thick.</p> <p>If the module is mounted without an enclosure, it should be mounted vertically with connectors facing left or right to reduce likelihood of moisture entry.</p> <p>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.</p> <p>No wire or cable harness should exceed 30 meters in length. The power input wiring should be limited to 10 meters.</p> <p>All field wiring should be suitable for the operating temperature range.</p> <p>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).</p>
Termination	External 120Ohm termination is required.



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

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/>.

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