TECHNICAL DATASHEET #TDAXTC4CO

Thermocouple Module, 4 Channel
P/N: AXTC4CO

Monitors 4 Type J, K or T Thermocouples
CANopen®, RS-232

Description:

The Thermocouple Module monitors up to 4 channels of Type J, K or T thermocouples. The temperature information is provided to the engine control system over CANopen®. Temperature is measured in ºC, with a 0.001ºC resolution. The scanner will send temperatures with +/- 1ºC accuracy. The operator has the option of disabling the automatic cold-junction compensation. Average temperature of all the active channels, or all channels from a block of 2, can be broadcasted to the CAN network. The scanner can flag low temperature warnings, high temperature warnings, or high temperature shutdowns to the engine control system. It will also detect and indicate open circuits on the sensor wires. All channels are fully isolated and measure temperatures at the same time. CAN communications are via an isolated CAN interface with CANopen® protocol. A SAEJ1939 model is available. A RS-232 interface allows for quick user adjustments using Tera Term. The power supply was designed for a wide range of nominal inputs of 12V or 24Vdc. Using commercially available CANopen® service tools, the operator can configure the controller to suit a wide variety of applications using SDO object access, per CiA DS-301. An EDS file is provided.

Applications:

- Power generator sets and control systems for industrial engine applications.

Ordering Part Numbers:

Thermocouple Module, 4 Channels, CANopen®: **AXTC4CO**
EDS file and User Manual #UMAXTC4CO: **CD-AXTC4CO**

Accessories:

Mating Plug Kit: **PL-DTM06-12SA-12SB**
or AX070000 Mating plug kit with RS-232 connector

Features:

- Reads up to 4 Type J, K or T thermocouple inputs (other thermocouple types on request)
- Full channel to channel isolation and isolation from CAN line, other inputs and power supply
- Cold junction compensation is provided as an enable/disable function
- Thermocouple input resolution is 0.001 °C.
- Accuracy is +/-1 °C throughout the entire range of the thermocouple input.
- Average temperature of all the active channels, or all channels from a block of 2, can be broadcasted to the CAN network.
- Detects and indicates open circuits on the sensor wires
- 12V or 24Vdc nominal with reverse polarity protection
- Compact size for mounting directly on the power generator set or remotely
- Rugged IP67 rated packaging with plug-in connections
- Operational from -40 to 85°C (-40 to 185°F)
- RS-232 port for configuration and diagnostics
- Using commercially available CANopen® service tools, the operator can configure the
- An EDS file is provided.

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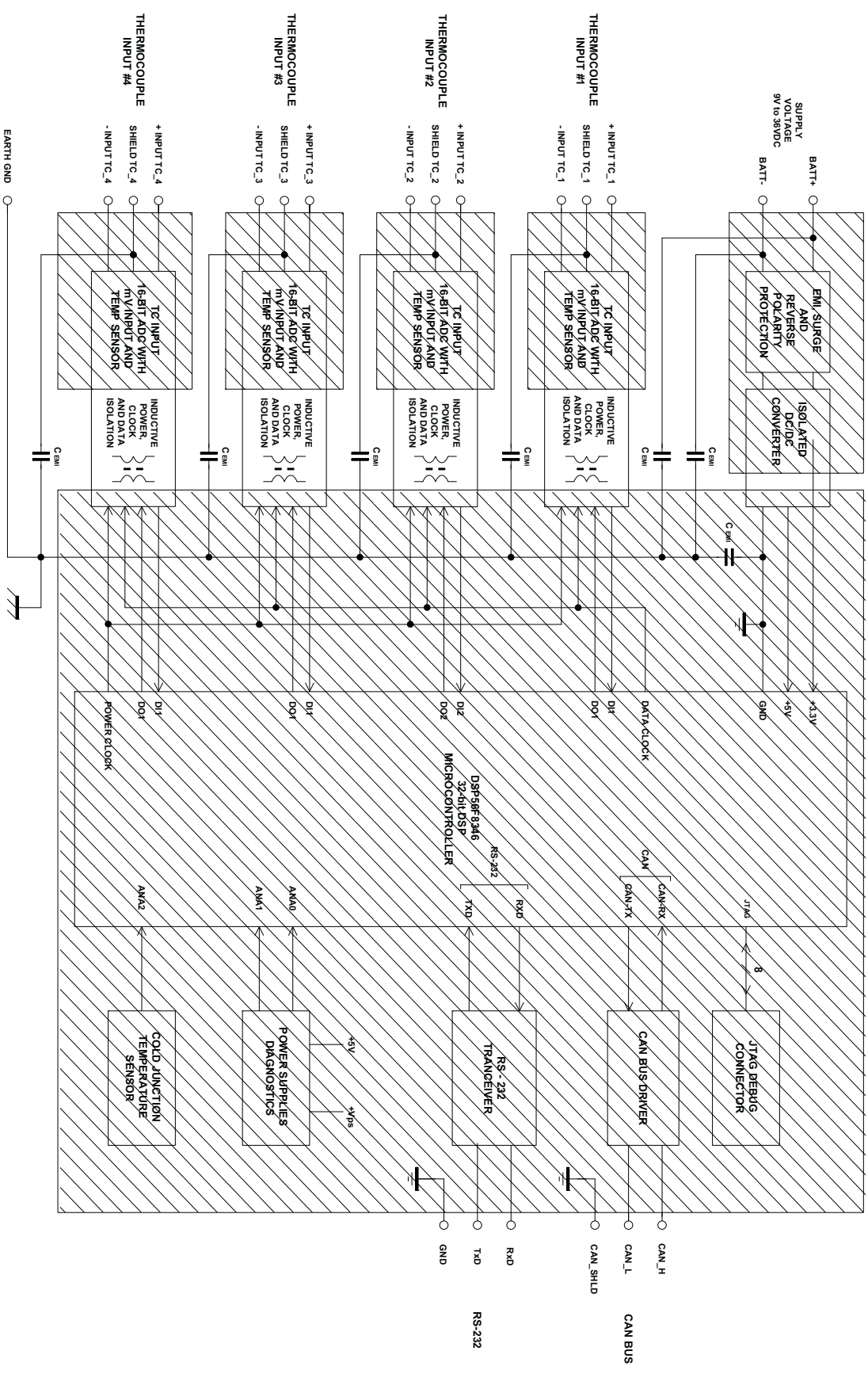

SUPPLY VOLTAGE 9V to 36VDC
BATT+
BATT-
EMI, SURGE AND REVERSE POLARITY PROTECTION
ISOLATED DC/DC CONVERTER
C EMI
+3.3V
+5V
GND
JTAG
8
JTAG DEBUG CONNECTOR
DATA/CLOCK
DI1
DO1
CAN
CAN-RX
CAN-TX
CAN BUS DRIVER
CAN_H
CAN_L
CAN_SHLD
CAN BUS
DSP56F8346 32-bit DSP MICROCONTROLLER
RS-232
RXD
TXD
RS - 232 TRANCEIVER
RxD
TxD
GND
RS-232
ANA0
ANA1
ANA2
POWER SUPPLIES DIAGNOSTICS
+5V
+Vps
COLD JUNCTION TEMPERATURE SENSOR
POWER/CLOCK
THERMOCOUPLE INPUT #1
THERMOCOUPLE INPUT #2
THERMOCOUPLE INPUT #3
THERMOCOUPLE INPUT #4
+ INPUT TC_1
SHIELD TC_1
- INPUT TC_1
+ INPUT TC_2
SHIELD TC_2
- INPUT TC_2
+ INPUT TC_3
SHIELD TC_3
- INPUT TC_3
+ INPUT TC_4
SHIELD TC_4
- INPUT TC_4
TC INPUT 16-BIT ADC WITH mV INPUT AND TEMP SENSOR
INDUCTIVE POWER, CLOCK AND DATA ISOLATION
EARTH GND

Technical Specifications:

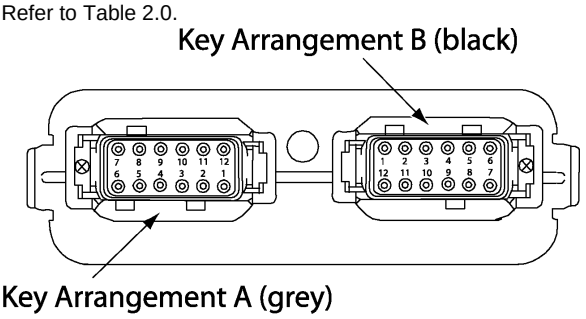
Input Specifications

Power Supply Input	12V or 24Vdc nominal (9…36Vdc power supply range) NB. The maximum total power consumption is <1.5 Watts.
Protection	Surge and reverse polarity protection are provided. Power supply input section protects against short circuits.
Isolation	Full isolation of each channel from the CAN line, other inputs and power supply. Isolation voltage is 1500 Vac (rms) or 2550V for 1 sec. for all channels to power and 50V (rms) for all channels to CAN interface.
All Inputs	4 Type J or K or T Thermocouple Modules (other types on request) All input channels are completely independent of each other and can read the thermocouple temperatures at the same time. Temperature is measured in °C with a 0.001°C resolution. All inputs send a message to the J1939 bus. *Refer to the user manual for details.*
Measurement Rate	The measurement rate is 5 scans/Sec. All channels are measured simultaneously. The update rate is 200 mSec.
Common Mode	Common mode rejection is >110 db@ 5V p-p (programmable for either 50 or 60 Hz). Common mode input range is +/- 4 V minimum.
Resolution	Temperature data is measured with a resolution of 0.001 °C.
Drift	Overall drift with temperature is 50ppm/°C of span (maximum).
Accuracy	+/-1 °C throughout the entire range of the thermocouple input
Input Protection	Open circuit protection is provided. Over and under temperature detection is provided. High temperature shutdown detection is provided.
Input Configuration	Refer to the user manual for details on configuration.
Shield	Four shield connections are provided.
Ground	Four analog ground connections are provided.

General Specifications

Operating Conditions	-40 to 85°C (-40 to 185°F)
Weight	0.55 lb. (0.25 kg)
Protection	IP67; Unit is conformal coated within the housing. Plugs carry an IP69 rating.
Vibration	MIL-STD-202G, Test 204D and 214A (Sine and Random) 10 g peak (Sine) 7.68 Grms peak (Random)
Shock	MIL-STD-202G, Test 213B: 50 g
Supply Current	150 mA @ 12V, typical 90 mA @ 24V, typical
Microprocessor	Motorola DSP56F8346
Control Logic	User programmable functionality uses SDO object access per CiA DS-301 with commercially available CANopen® tools. Settings are saved to non-volatile memory upon command. Application-specific software versions are available on request. *Refer to the user manual for details.*
RS-232 Port	The controller's RS232 port interfaces to a serial port (i.e. COM1) on a PC (115200 Baud Rate, N81, Xon/Xoff Flow Control). If the Axiomatic plug kit with a built-in RS-232 connector is not used, then the end user can make a RS-232 cable with the following pinout. Controller Grey Connector, Pin 2 -> TXD -> female DB-9 Pin 2 Controller Grey Connector, Pin 3 -> RXD -> female DB-9 Pin 3 Controller Grey Connector Pin 1 -> GND -> female DB-9 Pin 5
User Interface	EDS file is provided to interface to standard CANopen® tools.
CAN Interface	1 CAN 2.0B port, protocol CiA CANopen® By default, the Thermocouple Scanner transmits the process value (object $7130) according to device profile in the CiA Standard DS-404. (SAE J1939 model is available)

Bit-rate	Default bit-rate is 125 kbit/s. Other bit-rates can be selected using Layer Setting Services. Refer to the User Manual for details.
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 could be placed between CAN_H and CAN_L terminals at both ends of the network.
Diagnostics	Available on mandatory object $1003, Pre-Defined Error Field Additional information for diagnostic and testing purposes can be obtained using the RS-232 port and Tera Term.
Electrical Connections	Refer to Table 2.0.

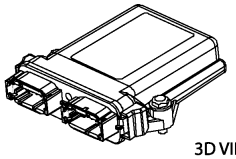
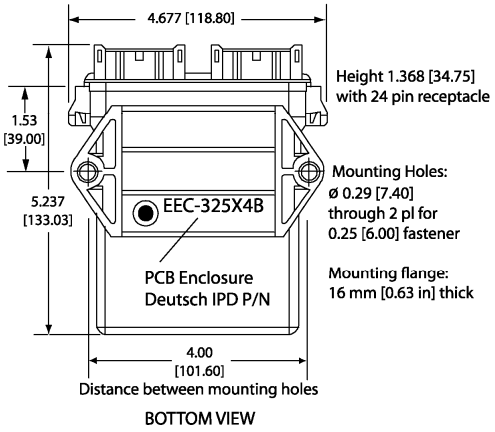
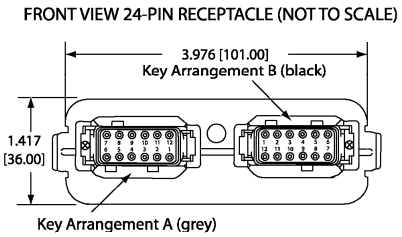


FRONT VIEW 24 PIN RECEPTACLE

Deutsch DTM series 24 pin receptacle (DTM13-12PA-12PB-R008)
Mating plugs kits are available on request and include Deutsch 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.

Table2.0 - Typical Connections, AXTC4

Grey Connector		Black Connector	
Pin #	**Function**	**Pin #**	**Function**
1	RS-232_GND	1	TC IN1+
2	RS-232_TXD	2	TC IN1-
3	RS-232_RXD	3	TC1_Shield
4	Not Used	4	TC IN2+
5	Frame GND	5	TC IN2-
6	Battery -	6	TC2_Shield
7	Battery +	7	TC3_Shield
8	Not Used	8	TC IN3-
9	Not Used	9	TC IN3+
10	CAN_L	10	TC4_Shield
11	CAN_H	11	TC IN4-
12	CAN_Shield	12	TC IN4+

Enclosure and Dimensions	High Temperature Nylon housing, Deutsch IPD PCB Enclosure (EEC-325X4B) 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 plug)  HOUSING DIMENSIONS Housing Material: High Temperature Nylon (Black) 3D VIEW Housing with 24 Pin Receptacle   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)

The CANopen® 4 Channel Thermocouple Scanner is compliant with the following CiA profiles.

- CiA DS-301 V4.1 – *CANopen® Application Layer and Communication Profile* (CAN in Automation 2005)
- CiA DS-305 V2.0 – Layer *Setting Service (LSS) and Protocols* (CAN in Automation 2006)
- CiA DS-404 V1.2 – *CANopen® profile for Measurement Devices and Closed Loop Controllers* (CAN in Automation 2002)

The documents are available from the CAN in Automation e.V. website http://www.can-cia.org.

Note: CANopen® is a registered community trade mark 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 www.axiomatic.com/service.html.

Form: TDAXTC4CO-03/03/16