

RTD to Fiber Optic Module

P/N: AX180610

Applications

Engine control systems and gensets requiring isolation of RTDs and remote installation of RTD controllers.

Ordering Part Numbers

The following parts operate together as a pair.

- RTD to Fiber Optic Module (RTD-FO) – P/N: **AX180610**
- Fiber Optic to CAN, RTD Isolator Module (FO-CAN) – P/N: **AX143030**
(Refer to datasheet TDAX143030)

Notes:

- The AX180610 and the AX143030 work together as a pair over a FO connection.
- FO cables are not supplied.

Description

RTD controllers are present in engines and gensets where RTDs are used to measure exhaust, winding, and fluid temperatures. However, the controller is prone to damage or tampering in the field. The split functionality of AX180610 and AX143030 helps remove the controller module from the field to an area where it can be better protected. Communication over FO provides low latency and inherent isolation between the modules. All RTD channels are automatically sent over the FO when the devices are powered on, without additional programming or configuration.

The RTD-FO unit powers and collects data from up to 8 Pt100 RTDs (2, 3, or 4-wire types). It provides digital isolation from battery power to chassis and from battery power to inputs. It relays temperature data to the FO-CAN unit over an FO connection. The FO-CAN unit remotely processes this data and provides temperature readings and related warnings through CAN bus (SAE J1939) to the engine control system (ECM) at 250 kbps baud rate.

The AX143030 is configurable via CAN bus using the Axiomatic Electronic Assistant KIT. The user can program a set of parameters for each input to support diagnostic messaging for RTD integrity and fault notification as well as use Averaging Blocks to provide grouping and filtering options for the inputs. The relevant configuration settings are relayed back by the AX143030 to the AX180610 over the FO. Setpoint configuration can be saved in a file which can then be utilized to apply the same configuration to other AX180610 and AX143030 pairs.

The AX180610 features rugged packaging and watertight TE Deutsch connectors as well as fiber optic connectors. The AX143030 comes in a vented IP20 enclosure with DIN rail mount.



Block Diagram

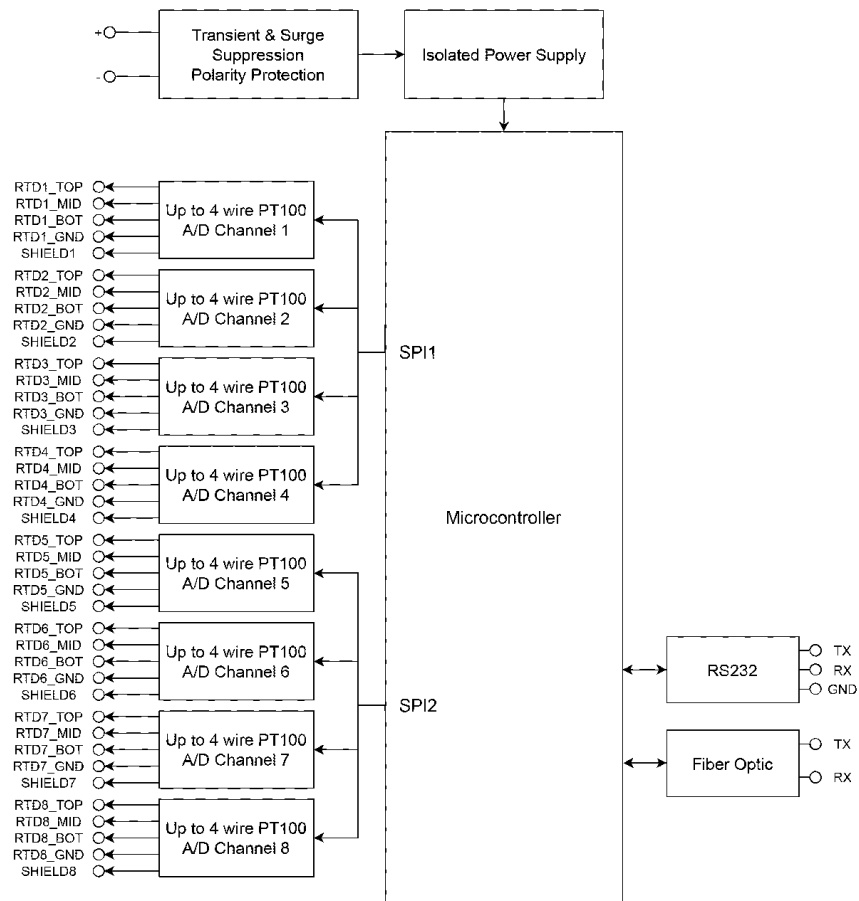
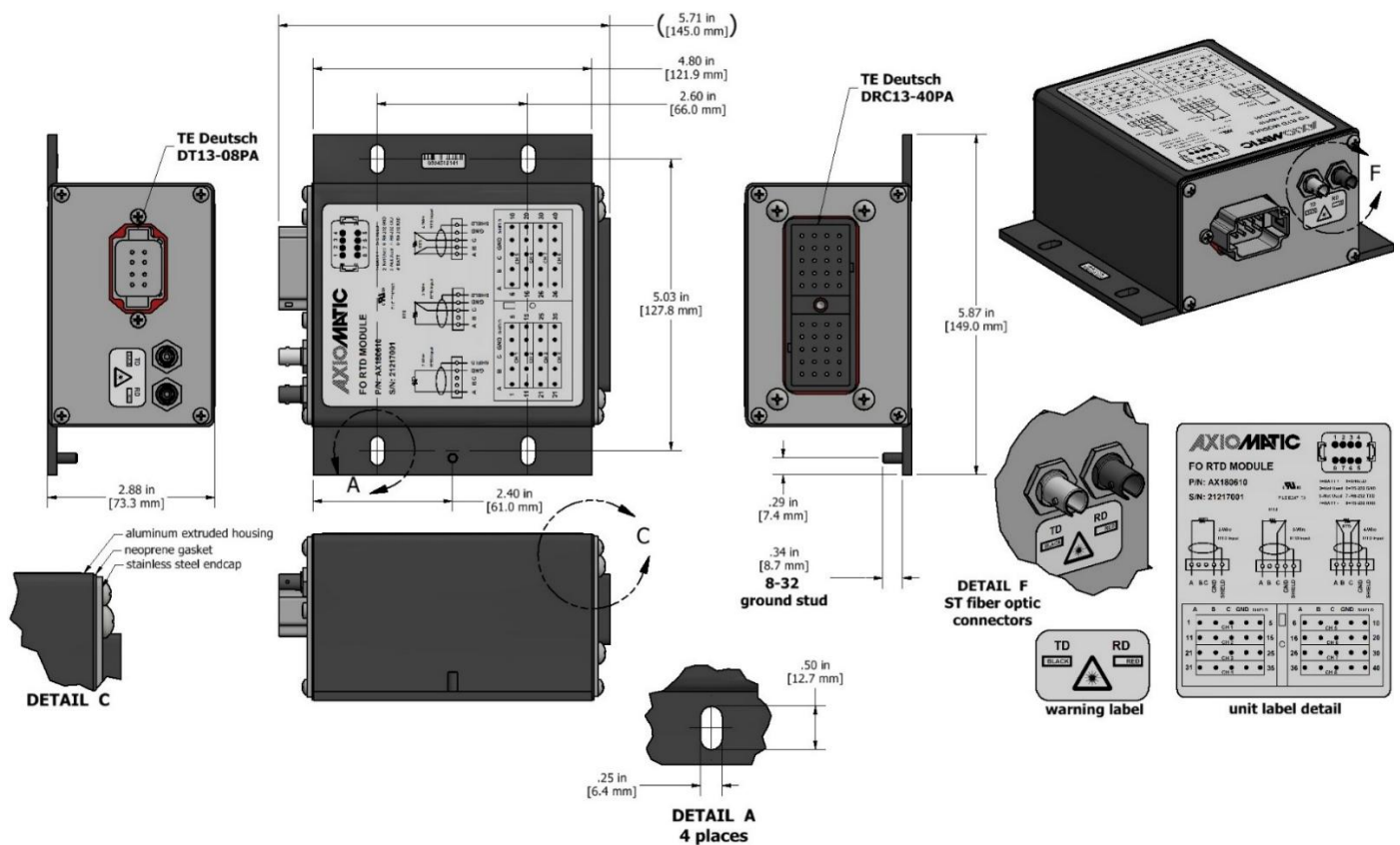


Figure 1.0 – Block Diagram

Dimensional 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 Limitations & Return Materials Process as described on <https://www.axiomatic.com/service/>.

All specifications are typical at nominal input voltage and 25 °C unless otherwise specified.

Power Supply

Power Input	12 or 24 V _{DC} nominal (9 to 32 V _{DC} range)
Supply Current	41 mA @ 12 V; 19 mA @ 24 V (typical)
Protection	Reverse polarity protection is provided. The power input circuit protects against transient surges and short circuits. The fiber optic connection provides inherent isolation.

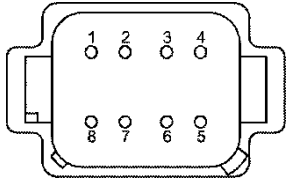
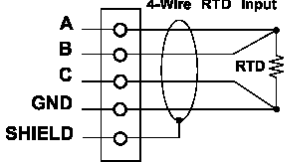
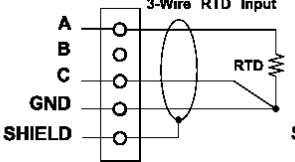
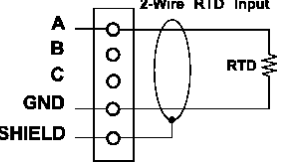
Inputs

RTD Types	Up to 8x channels, independently configurable for 2, 3, or 4 wire Class B 100 Ω Platinum RTDs (Pt100)
RTD Inputs	Each channel independently supports specific sensors: IEC 0.00385, JIS 0.003916, US 0.003902, Legacy 0.003920, and SAMA 0.003923. A user defined coefficient would enable custom Callendar-Van Dusen constants to be set for sensors not listed above. The device accepts inputs within the range of 10 to 350 Ω. Resolution: 0.001 °C Accuracy: ±1 °C (typical) at ambient temperature (<i>Note: Operating with two wire RTD inputs connected will show an extra ±0.5 Ω of accuracy error.</i>)
Scan Rate	100 ms per channel, total sweep time maximum 900 ms
Common Mode Readings	Input range ± 4 V maximum Rejection is 100 db at 5 V _{p-p} (50 to 60 Hz)
Thermal Drift	150 ppm/°C of span (max.)
Isolation	Digital isolation is 1000 V _{DC} for 1 minute with current limit 0.4 mA (or 800 V _{AC} for 2 s with current limit 5 mA) from battery power to chassis. Isolation is 500 V _{DC} for 1 minute with current limit 0.4 mA (or 700 V _{AC} for 2 s with current limit 5 mA) from battery power to RTD inputs.
SPNs	RTD data is processed by the AX143030. It supports the following. The Suspect Parameter Number (SPN) drop list includes all temperature SPNs from the J1939-71 standard published up to January of 2009. If an SPN is not supported by the drop list, the user can select a zero SPN, which then allows them to define the SPN and Parameter Group Number (PGN) per the application requirements. One-byte parameters have a resolution of 1 °C/bit and a range of -40 to 210 °C. Two-byte parameters have a resolution of 0.03125 °C/bit and a range of -273 °C to 1735 °C (per SAE J1939).
Averaging	RTD data is processed by the AX143030. It supports the following. The averaging function blocks can be configured to average any combination of the active input channels and be broadcast over the CAN network as a distinct control source.
Protection	Open circuit detection Frozen data detection Over or under-temperature detection High temperature shutdown detection

General Specifications

Microcontroller	STM32F413CGU6 1.5 MB flash memory, 320 KB RAM
Isolation	Digital isolation from battery power to chassis and from battery power to inputs. Communication over FO provides inherent isolation between the AX143030 and AX180610 modules.
Control Logic	The AX180610 unit collects data from the RTD channels and relays it to the AX143030 over an FO connection. The AX143030 remotely processes this data and provides temperature readings and related warnings through CAN bus (SAE J1939) to the engine control system (ECM) at 250 kbps baud rate.
Diagnostics	Diagnostics are managed in the AX143030. Configurable Diagnostic Messaging parameters Diagnostic Log is maintained in non-volatile memory. Each RTD channel can be configured to send diagnostic messages to the network if the temperature goes out of range. When sending an "Active Diagnostic Trouble Code" (DM1) or a "Previously Active Diagnostic Trouble Codes" (DM2) message, the controller will use the appropriate Diagnostic Trouble Code (DTC). As defined by the standard, this is a combination of the Suspect Parameter Number (SPN), the Failure Mode Indicator (FMI), Occurrence Count (OC) and the SPN Conversion Method (CM).
User Interface	The AX143030 is configurable via CAN bus using the Axiomatic Electronic Assistant KIT – AX070502 or AX070506K .
Compliance	UL and cUL: Standard for Controllers for Use in Power Production, CAN/ULC 6200, 1st edition RoHS
Protection	For the product assembly, the rating for the seal between the AX180610 housing and the fiberoptic connector bodies is IP54. The 40-pin TE connector has an IP67 rating.
Humidity	Protected against 95 % humidity (non-condensing) at 30 to 60 °C
Vibration	7.32 G _{RMS}
Operating Temperature	-40 to 80 °C (-40 to 176 °F)
Storage Temperature	-50 to 120 °C (-58 to 248 °F)
Weight	2.15 lb. (0.98 kg)
Enclosure	Rugged aluminum housing Stainless steel end plates Neoprene gaskets 5.71 in. x 5.87 in. x 2.87 in. (145 mm x 149 mm x 73 mm) L x W x H includes the 2 integral connectors
Installation	Can be mounted directly on the power generator set or remotely Suitable for moist, high shock, vibrating and non-hazardous environments

Electrical Connections

Power Connector	1x 8-pin TE Deutsch connector – P/N: DT13-08PA Mates with TE Deutsch P/N DT06-08SA <table><tr><th>Pin</th><th>Function</th></tr><tr><td>1</td><td>Power +</td></tr><tr><td>2</td><td>Not Used</td></tr><tr><td>3</td><td>Not Used</td></tr><tr><td>4</td><td>Power -</td></tr><tr><td>5</td><td>Not Used</td></tr><tr><td>6</td><td>RS-232 Ground</td></tr><tr><td>7</td><td>RS-232 TXD</td></tr><tr><td>8</td><td>RS-232 RXD</td></tr></table> 	Pin	Function	1	Power +	2	Not Used	3	Not Used	4	Power -	5	Not Used	6	RS-232 Ground	7	RS-232 TXD	8	RS-232 RXD
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RTD Connector	1x 40-pin TE Deutsch connector – P/N: DRC13-40PA mates with P/N DRC16-40SE-A or DRC18-40SA or DRC16-40S with 40x sockets 0462-201-16141. 4-Wire RTD Input  3-Wire RTD Input  2-Wire RTD Input  A B C GND SHIELD CH 1 1 5 6 10 CH 5 CH 2 11 15 16 20 CH 6 CH 3 21 25 26 30 CH 7 CH 4 31 35 36 40 CH 8 FRONT VIEW OF MODULE MOUNTED CONNECTOR																		
Fiber Optic Connectors	1x HFBR-1412TZ 1x HFBR-2412TZ																		
Mating Plug KIT	The AX070200 KIT available from Axiomatic includes the following items. (These items may also be available from your local TE Deutsch distributor.) <table><tr><th>TE Deutsch P/N</th><th>Description</th></tr><tr><td>DT06-08SA</td><td>Plug, 8 contacts</td></tr><tr><td>DRC16-40S</td><td>40-pin plug, no key</td></tr><tr><td>0462-201-16141</td><td>48x 16 AWG sockets, solid, 16 to 20 AWG wire, 6mm</td></tr><tr><td>114017</td><td>24x sealing plugs, size 12-16 cavities, 12 to 18 AWG</td></tr><tr><td>W8S</td><td>Wedgelock</td></tr></table> Note: The sealing plugs are only needed in cases where pins are not used. A crimping tool from TE Deutsch is required to connect wiring to the sockets, P/N: HDT 48-00 or equivalent (not supplied).	TE Deutsch P/N	Description	DT06-08SA	Plug, 8 contacts	DRC16-40S	40-pin plug, no key	0462-201-16141	48x 16 AWG sockets, solid, 16 to 20 AWG wire, 6mm	114017	24x sealing plugs, size 12-16 cavities, 12 to 18 AWG	W8S	Wedgelock						
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