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# Data Sheet

## M1-31D Analog Input Module

### Four $\pm 100$ mVDC/Thermocouple Analog Inputs



Data Sheet: M1-31D Analog Input Module

### Description

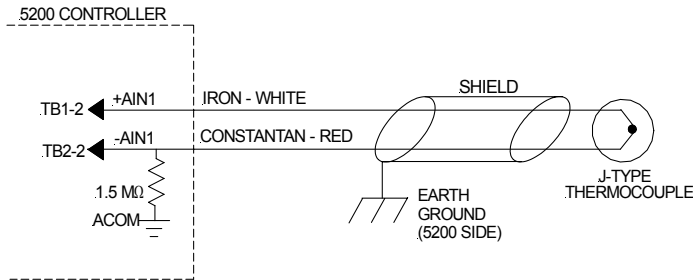
- ▶ Four 13-bit,  $\pm 100$  mVDC analog inputs
- ▶ Four differential-ended inputs for use with both grounded or ungrounded tip TC
- ▶ Thermocouple linearization algorithms: E, K, J, R, S, T
- ▶ Analog input circuitry is electrically isolated from CPU and communications electronics via optical isolators and DC-to-DC converters
- ▶ On-board input averaging, 64 samples per digital input

### M1-31D Specifications

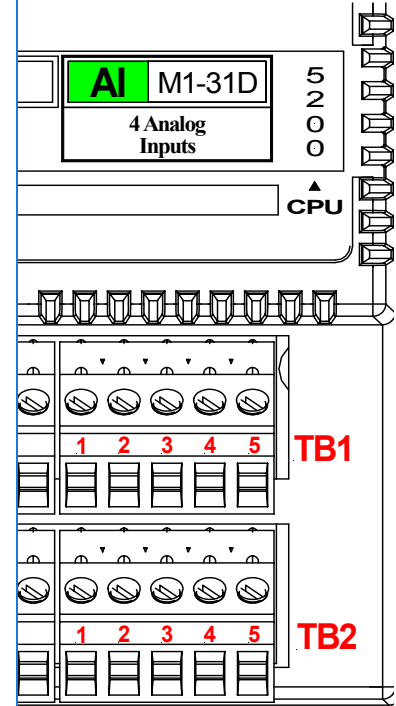
Parameter	Value	Description
<b>General</b>		
Number of inputs	4	Three differential-ended inputs and one single-ended input
Connection type	Screw terminal	Screw terminal spring clamp accepts #14-22 AWG wire. Terminated connector may also be unplugged.
Input type	$\pm 100$ mVDC	
Linearization Algorithms (Channel configurable)	E, K, J, R, S, T	Thermocouple Linearization Algorithms For additional TC algorithms, please contact Control Technology Corp.
Resolution	13-bit 0.1°	Straight Voltage Measurements: 1 in 8192 counts; 24.4 $\mu$ V/LSB Temperature Measurements
Engineering units (User configurable)	$\pm 10,000$ $\pm 100,000$ C, F, K	Integer numbers used by the Model 5200 to represent the input value 10000 = +100.00 mVDC (Default) 100000 = +100.000 mVDC ( $\pm 99,999,999$ = over/under range) 250 = 25.0 °C ( $\pm 99,999,999$ = over/under range)
Isolation rating	500 VDC	Isolation voltage between any input and other sensitive 5200 circuitry
Input protection	$\pm 15$ VDC	Absolute continuous input voltage
Input impedance:		
+Ain to -Ain	$10^{12} \Omega$	The impedance between the positive and negative inputs
+Ain to ACOM	$10^{12} \Omega$	The impedance between the input and analog ground
-Ain to ACOM	1.5M $\Omega$	The impedance between the positive input and analog common
+5 VDC supply current	0.2 mA	Current requirements from the 5200's +5 VDC power supply
<b>Performance</b>		
Full scale calibration error Ta=25°C Ta=Full range	$\pm 2$ LSB; $\pm 1^\circ$ $\pm 4$ LSB; $\pm 2^\circ$	The error between the measured input voltage and a true +10.000000 VDC Temperature specifications are for J, T, and E thermocouples only.
Offset calibration error Ta=25°C Ta=Full range	$\pm 1$ LSB; $\pm 1^\circ$ $\pm 2$ LSB; $\pm 2^\circ$	The error between the measured input voltage and a true 0.000000 VDC Temperature specifications are for J, T, and E thermocouples only.
Integral linearity error Ta=25°C Ta=Full range	$\pm 3$ LSB; $\pm 2^\circ$ $\pm 6$ LSB; $\pm 4^\circ$	The maximum error in the measured input voltage across the entire input range Temperature specifications are for J, T, and E thermocouples only.
Digital input filter size	64 samples	The number of samples used in an input's average calculation
Filter sample rate	400 $\mu$ Sec	The rate at which all analog input channels are sampled
<b>Environmental</b>		
Temperature	Operating: 0 to 50°C Storage: -25 to 85°C	Refer to the 5200 Controller Data Sheet Guide for proper mounting instructions.

**Application Information**

**Typical Application**



**Module Identification**



**Thermocouple Specifications**

TYPE	+ AIN		- AIN		RANGE ( °C )	
E	WHITE	CHROMEL	RED	CONSTANTAN	-250	980
J	WHITE	IRON	RED	CONSTANTAN	-190	1180
K	YELLOW	CHROMEL	RED	ALUMEL	-200	1360
R	BLACK	PLATINUM RHODIUM (10%)	RED	PLATINUM	-40	1740
S	BLACK	PLATINUM RHODIUM (10%)	RED	PLATINUM	-40	1750
T	BLUE	COPPER	RED	CONSTANTAN	-180	390

**I/O Terminations**

TB1-1	VS_OUT
TB1-2	+AIN #1
TB1-3	+AIN #2
TB1-4	+AIN #3
TB1-5	+AIN #4
TB2-1	VS_RTN
TB2-2	-AIN #1
TB2-3	-AIN #2
TB2-4	-AIN #3
TB2-5	-AIN #4

**Notes**



- Shield grounds must be terminated on the 5200-controller side of the cable.
- For register and programming information, refer to the Model 5200 Applications Guide.
- For other thermocouple types, please contact Control Technology Corp.
- VS refers to the voltage supply of the controller.
- For new designs, CTC recommends using module M1-33D instead of this module.

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