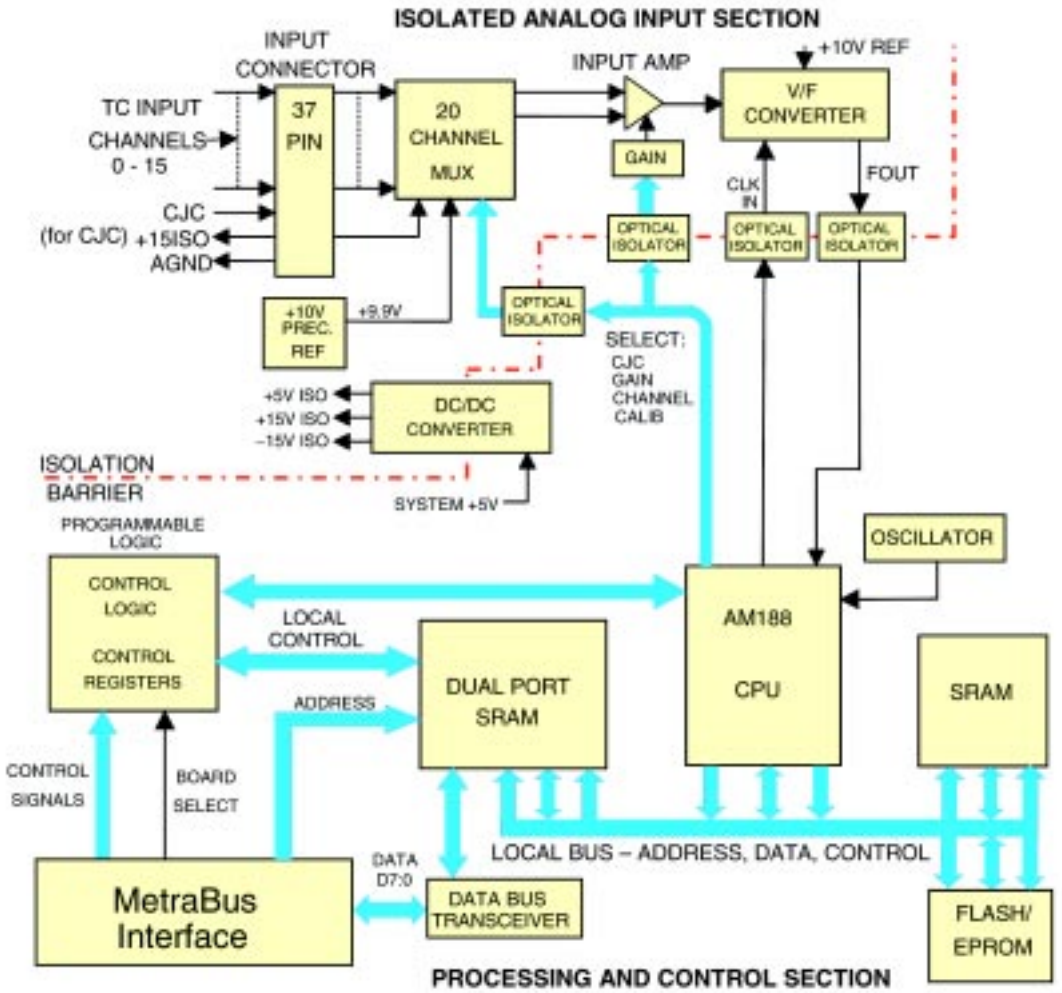
MAI-TC

16-Channel, Thermocouple Input Board for the MetraBus

Features

- Reads TC types J, K, E, T, R, S and B
- On-board processor performs conversions to temperature
- 16 fully differential analog inputs
- Resolution as high as 0.03 °C
- Detachable screw terminals simplify field wiring
- Auto-calibrating
- Monitor up to 256 thermocouples per PC slot
- 500-volt isolation between thermocouples and MetraBus cable
- Can be installed up to 100 feet from host computer

Block Diagram



MAI-TC

Functional Description

The MAI-TC is a 16-channel thermocouple input board for use with the MetraBus. An on-board microprocessor performs all system control as well as converting the raw analog input data into temperature. The board is based an a highly accurate and noise immune V/F based analog-to-digital converter.

The analog input section consists of a 16-channel input multiplexer, a CJC input, a programmable-gain amplifier, and a high-frequency V/F based A/D converter. Input sample rates may be set to frequencies of 50 Hz, 60 Hz, or 400 Hz. To minimize input noise, match the sample rate frequency to the frequency of the high-voltage power supplied in your area. This will take advantage of the A/D's integrating nature and remove much of the error caused by ambient electronic noise. Note that a lower sample rate produces higher resolution and an improved signal-to-noise ratio.

During each scan the A/D converter samples each of the thermocouple inputs, measures the CJC input, measures the input gain using the precision reference voltage, and measures the input offset voltage. The processor then takes the raw input data adjusts it based on calibration and CJC factors and converts the data into temperatures. The processor then places the data into the on-board FIFO, ready to be read by the MetraBus.

The MAI-TC board uses four consecutive addresses on the MetraBus. This allows a single MetraBus driver board to monitor up to 16 MAI-TC boards or up to 256 thermocouple inputs. The MAI-TC is an ideal solution in a wide array of industrial and large-scale temperature monitoring applications.

Detachable screw terminals on the MAI-TC simplify field wiring, and accept standard 12-22 AWG wire sizes. The MAI-TC is compatible with all MetraBus mounting and installation chassis and hardware, making it easy to install the boards in NEMA chassis, in 19-inch racks, on DIN rails, or on any flat surface.

MetraBus programming is very easy. You may write direct register I/O programs, take advantage of the Universal Library, or use SoftWIRE, DAS Wizard, or any of a wide variety of compatible software packages.

Specifications

Analog Inputs

Number of channels	16 differential
A/D converter type	AD652 V/F Converter
A/D pacing	Continuous, programmable for 50 Hz, 60 Hz, or 400 Hz;

Accuracy & Resolution

TC Type	Range	Accuracy
J	0 to 750°C	±0.5 °C
K	-200 to 1250°C	±1.4 °C
E	-200 to 900°C	±1.1 °C
T	-270 to 350°C	±0.9 °C
R	0 to 1450°C	±2.3 °C
S	0 to 1450°C	±2.3 °C
B	0 to 1700°C	±3.0 °C

Resolution:	@ 50Hz	@ 60Hz
0.05 °C	0.05 °C	0.40 °C
0.05 °C	0.05 °C	0.40 °C
0.03 °C	0.04 °C	0.25 °C
0.03 °C	0.04 °C	0.25 °C
0.06 °C	0.07 °C	0.44 °C
0.06 °C	0.08 °C	0.52 °C
0.07 °C	0.08 °C	0.54 °C

Data transfer	Single I/O register transfer through Dual Port RAM
Linearity error (A/D specs)	±0.05% @ 4 MHz fclock
Gain drift (A/D specs)	±75 ppm/°C max
Zero drift (A/D specs)	±50uV/°C max
Overvoltage Protection	-40 to +55V
CMRR @ 60Hz	80dB min
Input leakage current	±80 nA max
Input impedance	100 megohms min
Absolute maximum input	-40V to +55V
Isolation to MetraBus cable	500V min
Miscellaneous	Averaging - Moving average, 1 to 16 samples, software-selectable
Calibration -	each channel scan removes offset and gain error; also CJC each time.
Processor reset -	On power-up, watchdog time-out, or s/w command.
Temperature units -	Programmable for conversion to degrees C or degrees F
Crystal oscillator	32 MHz; accuracy 100ppm

Power Consumption

+5 V	400 mA typical, 600 mA max.
+15 V	20 mA typical, 30 mA max
-15 V	25 mA typical, 35 mA max

Environmental

Operating Temperature:	0 to 70°C
Storage Temperature:	-40 to 100° C
Humidity	0 to 90% noncondensing

Physical

Size:	16 x 4.8 inches (40.64 x 12.192 cm)

Ordering Guide

MAI-TC 16 Channel thermocouple input board for the MetraBus