

# Specifications

**CIO-DAS-TC**



**MEASUREMENT  
COMPUTING™**

# Specifications

Typical for 25 °C unless otherwise specified.

Specifications in *italic text* are guaranteed by design.

## Analog input

Table 1. Analog input specifications

|  |  |
|--|--|
| A/D converter type                     | AD652 V/F converter  |
| Number of channels                     | 16 differential thermocouple inputs, 1 CJC input   |
| Programmable ranges                    | -2.5 V to +10 V, -20 mV to +80 mV, -15 mV to +60 mV, -6.25 mV to 25 mV   |
| Voltage gains                          | 1, 125, 166.7, 400   |
| Thermocouple types                     | J, K, E, T, R, S, B  |
| A/D pacing                             | Continuous conversions. Software-programmable for 50 Hz, 60 Hz, or 400 Hz  |
| A/D trigger sources                    | Software-triggered   |
| Data transfer                          | Single I/O register transfer through dual port RAM   |
| Conversion rates (integrating time)    | 50 Hz, 60 Hz, 400 Hz<br>Software programmable  |
| <i>*Conversion rates (per channel)</i> | <i>25.0 msec @ 50 Hz typical, 25.5 msec maximum<br/>21.6 msec @ 60 Hz typical, 22.1 msec maximum<br/>7.4 msec @ 400 Hz typical, 7.9 msec maximum</i><br><br><i>*This is the total time to convert the channel, process the data, and provide a delay to switch the gain and channel.</i> |
| <i>Linearity error (A/D specs)</i>     | <i>±0.05% @ 4 MHz clock</i>  |
| <i>Gain drift (A/D specs)</i>          | <i>±75 ppm/°C max</i>  |
| <i>Zero drift (A/D specs)</i>          | <i>±50 uV/°C max</i>   |
| <i>Power supply rejection ratio</i>    | <i>0.01 %/V</i>  |
| <i>Overvoltage protection</i>          | <i>-40 V to +55 V</i>  |
| CMRR @ 60 Hz                           | 80 dB minimum  |
| Input leakage current                  | ±80 nA maximum   |
| Input impedance                        | 100 MegOhm minimum   |
| <i>Absolute maximum input voltage</i>  | <i>-40 V to +55 V</i>  |
| <i>Isolation to PC</i>                 | <i>500 V min through DC/DC converter and opto-isolators</i>  |

## Accuracy and resolution

Table 2. Accuracy and resolution (voltage measurements)

| Gain  | Range          | Accuracy (Worst Case)      | Resolution |          |          |
|-------|----------------|----------------------------|------------|----------|----------|
|       |                |                            | @ 50 Hz    | @ 60 Hz  | @ 400 Hz |
| 1     | -2.5 to 10 V   | ±0.01% of reading ±2.5 mV  | 312.5 μV   | 375 μV   | 2.5 mV   |
| 125   | -20 to 80 mV   | ±0.01% of reading ±20 μV   | 2.5 μV     | 3.0 μV   | 20.0 μV  |
| 166.7 | -15 to 60 mV   | ±0.01% of reading ±15 μV   | 1.88 μV    | 2.25 μV  | 15.0 μV  |
| 400   | -6.25 to 25 mV | ±0.02% of reading ±6.25 μV | 0.781 μV   | 0.938 μV | 6.25 μV  |

Table 3. Accuracy and resolution (Thermocouple measurements, not including CJC errors)

| TC Type | Range           | Accuracy (Worst Case) | Resolution |         |         |
|---------|-----------------|-----------------------|------------|---------|---------|
|         |                 |                       | @ 50Hz     | @ 60Hz  | @ 400Hz |
| J       | 0 to 750 °C     | ±0.5 °C               | 0.05 °C    | 0.05 °C | 0.40 °C |
| K       | -200 to 1250 °C | ±1.4 °C               | 0.04 °C    | 0.05 °C | 0.40 °C |
| E       | -200 to 900 °C  | ±1.1 °C               | 0.03 °C    | 0.04 °C | 0.25 °C |
| T       | -200 to 350 °C  | ±0.9 °C               | 0.03 °C    | 0.04 °C | 0.25 °C |
| R       | 0 to 1450 °C    | ±2.3 °C               | 0.06 °C    | 0.07 °C | 0.44 °C |
| S       | 0 to 1450 °C    | ±2.3 °C               | 0.06 °C    | 0.08 °C | 0.52 °C |
| B       | 0 to 1700 °C    | ±3.0 °C               | 0.07 °C    | 0.08 °C | 0.54 °C |

## Miscellaneous

Table 4. Miscellaneous specifications

|                   |  |
|-------------------|--|
| Averaging         | Moving average, 1 to 16 samples, software-selectable   |
| Calibration       | Calibration is performed with each channel scan to remove offset and gain error. CJC channel is also measured with each calibration. |
| Processor reset   | On power-up, watchdog timeout, or software command. Processor boots within one second of reset. Active low.                          |
| Watchdog timer    | 1.6 seconds nominal. Processor generates watchdog disable signal after boot-up.  |
| Temperature units | Programmable for conversion to °C or °F  |
| Interrupts        | 2, 3, 4, 5, 6, or 7  |
| Interrupt enable  | Programmable   |
| Interrupt sources | Dual port RAM when the processor mailbox has data.   |

## Crystal Oscillator

Table 5. Crystal oscillator specifications

|                           |                |
|---------------------------|----------------|
| <i>Frequency</i>          | <i>32 MHz</i>  |
| <i>Frequency accuracy</i> | <i>100 ppm</i> |

## CIO-STA-TC adapter

Table 6. CIO-STA-TC adapter specifications

|               |   |
|---------------|---|
| CJC type      | AD592CN   |
| Configuration | CJC centered in an isothermal block on which the screw terminals have been mounted. |
| Channels      | 16 (plus CJC output)  |

## Calibration error

Table 7. Calibration error specifications

|                  |                                |
|------------------|--------------------------------|
| @ 25 °C          | 0.3 °C typical, 0.5 °C maximum |
| 25 °C to +105 °C | 0.5 °C typical, 1.0 °C maximum |

## Linearity error

Table 8. Linearity error specifications

|                          |   |
|--------------------------|---|
| -25 °C to +105 °C        | 0.1°C typical, 0.35 °C maximum                                |
| Temperature coefficient  | 1 $\mu$ A/°C typical  |
| Long term stability      | 0.1 °C / month  |
| Open thermocouple detect | On/off switch selectable for each channel, full scale reading |

## Power consumption

Table 9. Power consumption specifications

|                |                                 |
|----------------|---------------------------------|
| +5 V operating | 887 mA typical, 1441 mA maximum |
|----------------|---------------------------------|

## Environmental

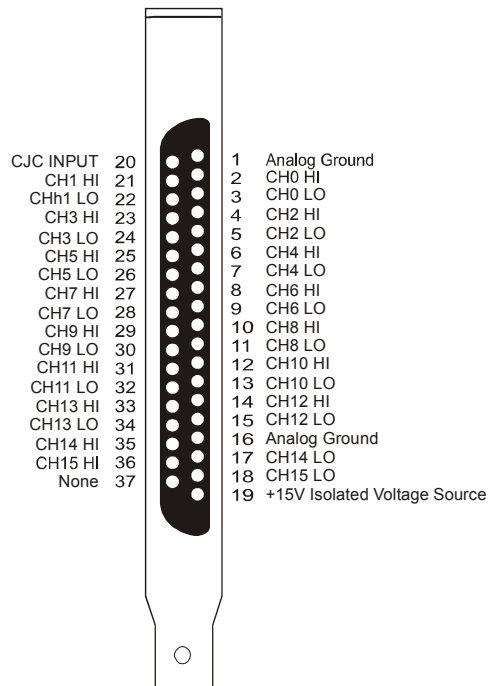
Table 10. Environmental specifications

|                             |                         |
|-----------------------------|-------------------------|
| Operating temperature range | 0 to 50 °C              |
| Storage temperature range   | -20 to 70 °C            |
| Humidity                    | 0 to 90% non-condensing |

## Main connector and pin-out

Table 11. Main connector specifications

|   |   |
|---|---|
| Connector type  | 37-pin D-type                           |
| Compatible cable                                      | C37FFS-x                                |
| Compatible accessory product<br>(with C37FFS-x cable) | CIO-STA-TC screw terminal adapter board |



**Measurement Computing Corporation**  
**16 Commerce Boulevard,**  
**Middleboro, Massachusetts 02346**  
**(508) 946-5100**  
**Fax: (508) 946-9500**  
**E-mail: [info@mccdaq.com](mailto:info@mccdaq.com)**  
**[www.mccdaq.com](http://www.mccdaq.com)**