CR23X Specifications

**Program Execution Rate**
Program is synchronized with real-time up to 100 Hz. Two fast (250 μs) single-ended measurements can write to final storage at 100 Hz. Burst measurements to 1.5 kHz are possible over short intervals.

**Analog Inputs**
**Description:** 12 differential or 24 single-ended, individually configured. Channel expansion provided through AM16/32 or AM16 Relay Multiplexers and AM25T Thermocouple Multiplexers.

- **Accuracy:** ±0.05% of FSR, 0° to 40°C
- **±0.05% of FSR, -25° to 50°C
- **±0.075% of FSR, -40° to 80°C (XT only)**

Note: ±5 μV offset voltage error is possible with single-ended (SE) measurements.

**Ranges and Resolution:**
- **Input Resolution (μV)**
  - Range (mV)
  - Accuracy (mV)
    - Minimum
    - Maximum
    - Peak to peak
    - Frequency
  - ±5000
    - 156 ±0.00
    - 1000 ±0.01
  - ±1000
    - 33.6 ±0.005
    - ±200
    - 6.66 ±0.005
    - ±10
    - 0.33 ±0.005
  - ±10
  - ±5
  - ±2.5
  - ±1.0
  - ±0.5

**Input Sample Rates:** Includes the measurement time and conversion to engineering units. Differential measurements incorporate two integrations with reversed input polarities to reduce thermal offset and common mode errors. Fast measurement integrates the signal for 250 µs; slow measurement integrates for one power line cycle (50 or 60 Hz).

- **Fast Single-ended Voltage:** 2.1 ms
- **Fast Differential Voltage:** 3.1 ms
- **Slow Single-ended Voltage (60 Hz):** 18.3 ms
- **Slow Differential Voltage (60 Hz):** 35.9 ms
- **Slow Differential Thermocoulo:** 6.9 ms

**Input Noise Voltage:** Typical for ±10 mV input Range; digital resolution dominates for higher ranges.
- **Fast Differential:** 0.60 μV rms
- **Slow Differential (60 Hz):** 0.15 μV rms
- **Fast Single-ended:** 1.20 μV rms
- **Slow Single-ended (60 Hz):** 0.30 μV rms

**Common Mode Range:** ±5 V

**DC Common Mode Rejection:** >100 dB

**Normal Mode Rejection:** 70 dB @ 60 Hz when using 60 Hz rejection

**Sustained Input Voltage Without Damage:** 16 Vdc max.

**Input Current:** ±2.5 nA typ.; ±10 nA max. @ 50°C

**Input Resistance:** 20 Gohms typical

**Accuracy of Built-in Reference Junction Thermistor:** For thermocouple measurements:
- ±0.25% at 0°C to 40°C
- ±0.5°C to 25° to 50°C
- ±0.7°C to 40° to 80°C (XT only)

**Analog Outputs**
**Description:** 4 switched, active only during measurement, one at a time; 2 continuous.

**Range:** Programmable between ±5 V

**Resolution:** 333 μV

**Accuracy:** ±5 mV; ±25 mV (0° to 40°C)

**Current Sourcing:** 50 mA for switched; 15 mA for continuous

**Current Sinking:** 50 mA for switched; 5 mA for continuous (15 mA for continuous with Boost selected in P133)

**Frequency Sweep Function:** The switched outputs provide a programmable sweep frequency, 0 to 5 V square wave for exciting vibrating wire transducers.

**Resistance Measurements**
**Measurement Types:** The CR23X provides ratiometric measurements of 4- and 6-wire half bridges, and 2-, 3-, and 4-wire full bridges. Precise, dual polarity excitation using any of the 4 switched outputs eliminates dc errors. Conductivity measurements use a dual polarity 0.75 ms excitation to minimize polarization errors.

- **Accuracy:** ±0.02% of FSR (±0.015%, 0° to 40°C) plus bridge resistor error

**Period Averaging Measurements**
**Description:** The average period for a single cycle is determined by measuring the duration of a specified number of cycles. Any of the 24 SE analog inputs can be used. Signal attenuation and ac coupling are typically required.

**Input Frequency Range:**
- **Signal Peak-to-peak:**
  - Min
  - Max
  - Pulse width
  - Frequency
  - ±500 mV
    - 10.0 V
    - 2.5 μs
    - 20 kHz
  - ±40 mV
    - 2.0 V
    - 10 μs
    - 50 kHz
  - ±5 mV
    - 2.0 V
    - 62 μs
    - 8 kHz
  - ±2 mV
    - 1.00 V
    - 100 μs
    - 5 kHz

1 Signals centered around datalogger ground
2 Assuming 50% duty cycle

**Resolution:** 12 ns divided by the number of cycles measured

**Accuracy:** ±0.01% of reading

**Pulse Counters**
**Description:** Four 8-bit or two 16-bit inputs selectable for switch closure, high frequency pulse, or low-level AC. Counters read at 10 or 100 Hz.

**Maximum Count Rate:**
- **2.5 kHz and 25 kHz, 8-bit counter:** 400 kHz, 16-bit counter.

**Switch Closure Mode:**
- **Minimum Switch Closed Time:** 5 ms
- **Maximum Switch Open Time:** 6 ms
- **Maximum Bounce Time:** 1 ms open without being counted

**High Frequency Pulse Mode:**
- **Minimum Pulse Width:** 1.2 μs
- **Maximum Input Frequency:** 400 kHz
- **Voltage Thresholds:** Count upon transition from below 1.5 V to above 3.5 V at low frequencies. Larger input transitions are required at high frequencies because of input filter with 1.2 μs time constant. Signals up to 400 kHz will be counted if centered around ±25 V with deviations ± ± 25 V for ≥ 1.2 μs.
- **Input Hysteresis:** ±0.5 V

**Low Level AC Mode:**
- **Internal ac coupling removes dc offsets up to ±0.5 V.**
- **Input Hysteresis:** 15 mV
- **Maximum Input Voltage:** ±20 V

**Program Storage:** Up to 16 kbytes for active program; additional 16 kbytes for alternate programs. Operating system stored in 512 kbytes Flash memory.

**Data Storage:** 1 Mbyte Flash standard.

**Additional 4 Mbytes Flash available as an option.**

**Display:** 24-character-by-2-line LCD

**Serial Interfaces:** Optically isolated RS-232 9-pin interface for computer or modem. CS 9-pin I/O interface for peripherals such as storage modules or CSM diodes.

**Baud Rates:** Selectable at 300, 1200, 2400, 4800, 9600, 19.2K, 38.4K, and 76.8K. ASCII protocol is one start bit, eight data bits, no parity, one stop bit.

**Clock Accuracy:** ±1 minute per month, -25° to +50°C, ±2 minutes per month, -40° to +85°C

**System Power Requirements**
**Voltage:** 11 to 16 Vdc

**Typical Current Drain:** 2 mA quiescent with display off (2.5 mA max), 7 mA quiescent with display on, 45 mA during processing, and 70 mA during analog measurement.

**Internal Batteries:** 10 Ahr alkaline or 7 Ahr rechargeable base. 1800 mAhr lithium battery for clock and SRAM backup typically provides 10 years of service.

**External Batteries:** Any 11 to 16 Vdc battery may be connected; reverse polarity protected.

**Physical Specifications**
**Size:** 9.5” x 7.0” x 3.8” (24.1 cm x 17.8 cm x 9.6 cm). Terminal strips extend 0.4” (1.0 cm) and terminal strip cover extends 1.3” (3.3 cm) above the panel.

**Weight:** 3.6 lbs (1.6 kg) with low-profile base 8.3 lbs (3.8 kg) with alkaline base 10.7 lbs (4.8 kg) with rechargeable base

**Warranty**
Three years against defects in materials and workmanship.

We recommend that you confirm system configuration and critical specifications with Campbell Scientific before purchase.