CR800-Series Specifications

Electrical specifications are valid over a -25°C to +50°C, non-condensing environment, unless otherwise specified. Recalibration recommended every three years. Critical specifications and system configuration should be confirmed with Campbell Scientific before purchase.

PROGRAM EXECUTION RATE
10 ms to one day @ 10 ms increments

ANALOG INPUTS (SE1-S6 or DIFF1-DIFF3)
3 differential (DIFF) or 6 single-ended (SE) individually configured input channels. Channel expansion provided by optional analog multiplexers.

RANGES and RESOLUTION: Basic resolution (Basic Res) is the resolution of a single A/D conversion. A DIFF measurement with input reversal has better (finer) resolution by twice than Basic Res.

| Range (mV) | Diff Res (µV)² | Basic Res (µV) 
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>±2000</td>
<td>667</td>
<td>1333</td>
</tr>
<tr>
<td>±2500</td>
<td>333</td>
<td>667</td>
</tr>
<tr>
<td>±250</td>
<td>33.3</td>
<td>66.7</td>
</tr>
<tr>
<td>±25</td>
<td>3.3</td>
<td>6.7</td>
</tr>
<tr>
<td>±2.5</td>
<td>0.33</td>
<td>0.67</td>
</tr>
</tbody>
</table>

1. Range overhead of -9% on all ranges guarantees that full-scale values will not cause over range.
2. Resolution of Diff measurements with input reversal.

ACCURACY¹:
±0.06% of reading + offset, 0° to 40°C
±0.12% of reading + offset, -25° to 50°C
±0.18% of reading + offset, -55° to 85°C

Accuracy does not include sensor and measurement noise.

Offset definitions as follows:
- Offset for DIFF w/ input reversal = 1.5-Basic Res + 1.0 µV
- Offset for Diff w/o input reversal = 3-Basic Res + 2.0 µV
- Offset for SE = 3-Basic Res + 3.0 µV

ANALOG MEASUREMENT SPEED:

<table>
<thead>
<tr>
<th>Integration Type Code</th>
<th>Integration Time</th>
<th>Setting Time</th>
<th>SE w/ No Rev</th>
<th>Diff w/ Input Rev</th>
</tr>
</thead>
<tbody>
<tr>
<td>250</td>
<td>250 µs</td>
<td>3 ms</td>
<td>-1 ms</td>
<td>-12 ms</td>
</tr>
<tr>
<td>50 Hz²</td>
<td>16.67 ms</td>
<td>3 ms</td>
<td>-20 ms</td>
<td>-40 ms</td>
</tr>
<tr>
<td>50 Hz²</td>
<td>20.00 ms</td>
<td>3 ms</td>
<td>-25 ms</td>
<td>-50 ms</td>
</tr>
</tbody>
</table>

= Includes 250 µs for conversion to engineering units.
= AC line noise filter.

INPUT NOISE VOLTAGE: For DIFF measurements with input reversal on ±2.5 mV input range; digital resolution dominates for higher ranges.

250 µs Integration: 0.34 µV RMS
50/60 Hz Integration: 0.19 µV RMS

INPUT LIMITS: ±5 V
DC COMMON MODE REJECTION: >100 dB
NORMAL MODE REJECTION: 70 dB @ 60 Hz when using 60 Hz rejection

INPUT VOLTAGE RANGE W/O MEASUREMENT CORRUPTION: ±8.6 Vdc max.
SUSTAINED INPUT VOLTAGE W/O DAMAGE: ±16 Vdc max.
INPUT CURRENT: ±1 nA typical, ±6 nA max. @ 50°C;
INPUT RESISTANCE: 20 G典型

ACCURACY OF BUILT-IN REFERENCE JUNCTION THERMISTOR (for thermocouple measurements):
+0.3°C to -25°C to +50°C
±0.0°C to -85°C

ANALOG OUTPUTS (VX1-VX2)
2 switched voltage outputs sequentially active only during measurement.

RANGE AND RESOLUTION:

<table>
<thead>
<tr>
<th>Channel</th>
<th>Range</th>
<th>Resolution</th>
<th>Current Source/Sink</th>
</tr>
</thead>
<tbody>
<tr>
<td>VX1-2</td>
<td>±2.5 Vdc</td>
<td>0.67 mV</td>
<td>±25 mA</td>
</tr>
</tbody>
</table>

Voltage outputs programmable between ±2.5 V with 0.67 mV resolution.

ANALOG OUTPUT ACCURACY (VX):
±0.06% of setting + 0.8 mV, 0° to 40°C
±0.12% of setting + 0.8 mV, -25° to 50°C
±0.18% of setting + 0.8 mV, -55° to 85°C

DIGITAL I/O PORTS (C1-C4)
4 ports software selectable, as binary inputs or control outputs. Provide on/off, pulse width modulation, edge timing, subroutine interrupts/wake up, switch closure pulse counting, high-frequency pulse counting, asynchronous communications (UARTs), SDI-12 communications, and SDM communications.

LOW FREQUENCY MODE MAX: ±1 kHz
HIGH FREQUENCY MAX: 400 kHz

RATIO METRIC MEASUREMENTS

MEASUREMENT TYPES: Provides ratiometric resistance measurements using voltage excitation. Three switch voltage excitation outputs are available for measurements of 4- and 6-wire full bridges, and 2-, 3-, and 4-wire half bridges. Optional excitation polarity reversal minimizes dc errors.

RATIO MEASUREMENT ACCURACY:
m²(V) = ±(0.04% of voltage measurement + offset)

Accuracy specification assumes excitation reversal for excitation voltages < 1000 mV. Assumption does not include bridge resistor errors and sensor and measurement noise.

Estimation accuracy, ΔX (where X is value returned from the measurement with Multiplier = 1, Offset = 0):

BrHalf() instruction: ΔX = ±0.25 V, ±0.5 V, ±1 V,
BrFull() instruction: ΔX = ±1000 mV, ±2000 mV, ±4000 mV, ±8000 mV, ±16000 mV, ±32000 mV

Voltage ±V X is calculated from the ratiometric measurement accuracy. See Resistance Measurements Section in the manual for more information.

Offsets are defined as:
- Offset for DIFF w/ input reversal = 1.5-Basic Res + 1.0 µV
- Offset for Diff w/o input reversal = 3-Basic Res + 2.0 µV
- Offset for SE = 3-Basic Res + 3.0 µV

Excitation reversal reduces offsets by a factor of two.

PULSE COUNTERS (P1-P2)
2 inputs individually selectable for switch closure, high frequency pulse, or low level ac. Independent 24-bit counters for each input.

MAXIMUM COUNTS PER SCAN: 16.7 x 10¹²

SWITCH CLOSURE MODE:
Minimum Switch Closed Time: 5 ms
Maximum Switch Open Time: 6 ms

HIGH FREQUENCY PULSE MODE:
Minimum Input Frequency: 250 Hz
Maximum Input Voltage: ±20 V
Voltage Thresholds: Count upon transition from below 0.9 V to above 2.2 V after input filter with 1.2 µs time constant.

LOW LEVEL AC MODE: Internal ac coupling removes dc offsets up to ±0.5 V.

Input Hysteresis: 12 mV @ 1 Hz
Maximum ac Input Voltage: ±20 V
Minimum ac Input Voltage: ±0.3 V

SYSTEM POWER REQUIREMENTS

VOLTAGE: 9.6 to 16 Vdc

INTERNAL BATTERIES: 1200 mAh lithium battery for clock and SRAM backup, typically provides 3 years of backup

EXTERNAL BATTERIES: Optional 12 Vdc nominal alkaline and rechargeable available. Power connection is reverse polarity protected.

TYPICAL CURRENT DRAIN @ 12 Vdc:
Sleep Mode: 0.7 mA typical; 0.9 mA max.
1 Hz Sample Rate (1 fast SE measurement): 1 mA
100 Hz Sample Rate (1 fast SE measurement): 16.2 mA
100 Hz Sample Rate (1 fast SE measurement w/SDI-12 communication): 28 mA
Active external keyboard display adds 7 mA (100 mA with backlight on)

PHYSICAL DIMENSIONS: 24.1 x 10.4 x 5.1 cm (9.5 x 4.1 x 2 in); additional clearance required for cables and leads.

WEIGHT: 0.7 kg (1.5 lb)

WARRANTY
3-years against defects in materials and workmanship.