

CR9000 & CR9000C I/O Module Specifications

Electrical specifications are valid over a -25° to +50°C range unless otherwise specified; testing over -40° to +70°C available as an option, excluding batteries. Non-condensing environment is required. To maintain specifications, Campbell Scientific recommends recalibrating dataloggers every two years.

CR9050(E) and CR9051E ANALOG INPUT MODULE with RTD

INPUT CHANNELS PER MODULE: 14 differential or 28 single-ended.

RANGE AND RESOLUTION:

Input Range (mV)	Resolution (1 A/D count) (μV)	Input Noise (μV RMS)	Max Sample Rates (kHz)
±5000	158.0	105	100
±1000	32.0	35	100
±200	6.3	7	50
±50	1.6	4	50

Input Range (mV)	Input Noise CR9050(E) (μV RMS)	Input Noise CR9051E (μV RMS)
±5000	105	130
±1000	35	35
±200	7	7
±50	4	4

Note: Measurement averaging provides lower noise and better resolution.

ACCURACY OF VOLTAGE MEASUREMENTS:

Single-Ended & Differential:

±(0.07% of reading + 4 A/D counts) -25° to +50°C

±(0.14% of reading + 4 A/D counts) -40° to +70°C

Dual Differential:

(two measurements with input polarity reversed)

±(0.07% of reading + 1 A/D count) -25° to +50°C

±(0.14% of reading + 1 A/D count) -40° to +70°C

COMMON MODE RANGE: ±5 V

DC COMMON MODE REJECTION: >120 dB

INPUT RESISTANCE: 2.5 gigaohms typical

MAXIMUM INPUT VOLTAGE WITHOUT

DAMAGE: ±20 V CR9050(E), -40 to +50V CR9051E

TYPICAL CURRENT DRAIN: 25 mA active

Resistance & Conductivity Measurements

(Also requires 9060 Excitation Module)

ACCURACY: ± (0.04% of reading + 2 A/D counts) limited by accuracy of external bridge resistors.

MEASUREMENT TYPES: 6-wire and 4-wire full bridge, 4-wire, 3-wire, and 2-wire half bridge. Uses excitation reversal to remove thermal EMF errors.

CR9052 ANTI-ALIAS FILTER MODULE

INPUT CHANNELS PER MODULE: six differential

CONTINUOUS EXCITATION CHANNELS PER MODULE: 12 (6 current, 6 voltage)

TYPICAL CURRENT DRAIN: 400 mA + 1.5*[I_{ex}],

where I_{ex} is the sum of excitation currents provided by all channels.

Refer to the CR9052 product literature for a complete listing of specifications.

CR9055(E) 50 V-ANALOG INPUT MODULE

INPUT CHANNELS PER MODULE: 14 differential or 28 single-ended.

RANGE AND RESOLUTION:

Input Range (V)	Resolution (1 A/D count) (μV)	Input Noise (μV RMS)	Max Sample Rates (kHz)
±50	1580	1050	100
±10	320	350	100
±2	63	85	50
±0.5	16	60	50

Note: Measurement averaging provides lower noise and better resolution.

ACCURACY OF VOLTAGE MEASUREMENTS:

Single-Ended & Differential:

±(0.1% of reading + 4 A/D counts) -25° to +50°C

±(0.2% of reading + 4 A/D counts) -40° to +70°C

Dual Differential:

(two measurements with input polarity reversed)

±(0.1% of reading + 1 A/D count) -25° to +50°C

±(0.2% of reading + 1 A/D counts) -40° to +70°C

COMMON MODE RANGE: ±50 V

DC COMMON MODE REJECTION: >62 dB

INPUT RESISTANCE: 100 kilohms typical

MAXIMUM INPUT VOLTAGE WITHOUT

DAMAGE: ±150 V

TYPICAL CURRENT DRAIN: 15 mA active

CR9060 EXCITATION MODULE

TYPICAL CURRENT DRAIN:

108 mA quiescent, 125 mA active

Analog Outputs

ANALOG OUTPUTS PER MODULE:

10 switched, 6 continuous

SWITCHED: Provides excitation for resistance measurements. Only one output can be active at a time.

CONTINUOUS: All outputs can be active simultaneously.

RANGE: ±5 V

ACCURACY: ± (0.2% of output ±4 mV)

RESOLUTION: 12-bit A/D (2.4 mV)

OUTPUT CURRENT: ±50 mA

Digital Control Outputs

CONTROL CHANNELS PER MODULE: 8

OUTPUT VOLTAGES (no load):

High: 5.0 V ±0.2 V

Low: < 0.2 V

OUTPUT RESISTANCE: 100 ohms

CR9071E COUNTER & DIGITAL I/O MODULE

Counter Channels

COUNTER CHANNELS PER MODULE: 12

MAXIMUM COUNTS PER INTERVAL: 2³² Maximum counts per interval should never be reached because with a maximum input frequency of 1 MHz, the 32-bit counter will go 71.58 minutes before it rolls over. The maximum CR9000 scan rate is 1 minute.

SWITCH CLOSURE MODE (4 channels)

Minimum switch closed time: 5 ms

Minimum switch open time: 6 ms

Maximum bounce time: 1 ms open without being counted

HIGH FREQUENCY MODE (all channels)

Minimum pulse width: 500 ns

Maximum input frequency: 1 MHz

Thresholds: Pulse counted on transition from below 1.5 V to above 3.5 V

Maximum input voltage: ±20 V

LOW LEVEL AC MODE (8 channels)

Input hysteresis: 10 mV

Minimum ac voltage: 25 mV RMS

Maximum input voltage: ±20 V

Frequency range:

(mV RMS)	RANGE (Hz)
25 mV	1 to 10,000
≥50 mV	0.5 to 20,000

Digital Inputs/Outputs

I/O CHANNELS PER MODULE: 16

OUTPUT VOLTAGES (no load)

High: 5.0 V ±0.2 V

Low: < 0.2 V

OUTPUT RESISTANCE: 320 ohms

Input State

High: 3.5 to 5 V

Low: -0.5 to 1.2 V

Input Resistance: 100 KOhms

Interval Measurement

I/O CHANNELS:

Resolution is the scan rate

PULSE CHANNELS

Maximum interval: 1 minute

Resolution: ±40 ns

CR9080 PCMCIA and MEMORY MODULE

PCMCIA CARD INTERFACE: Accepts two Type I/II, or one Type III SRAM or ATA Flash Memory Cards.

SERIAL I/O: Allows serial communications with CSI peripherals at up to 115,200 bps.

TYPICAL CURRENT DRAIN: 300 mA active

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



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