

# CR200X-series Datalogger Specifications

Electrical specifications are valid over a -40° to +50°C range unless otherwise specified; non-condensing environment required. We recommend that you confirm system configuration and critical specifications with Campbell Scientific before purchase.

## ANALOG INPUTS; DIGITAL I/O

Channels SE1 to SE5 can be individually configured for single-ended measurement or digital I/O.

### SINGLE-ENDED MEASUREMENT (SE1 TO SE5):

Analog Input Range:  $0 \leq V < 2.5$  Vdc

Measurement Resolution: 0.6 mV

Measurement Accuracy

Typical:  $\pm(0.25\%$  of reading + 1.2 mV offset)  
over -40° to +50°C

Worst-case:  $\pm(1\%$  of reading + 2.4 mV offset)  
over -40° to 50°C

### DIGITAL I/O (SE1 TO SE5):

Input/Output High State: 2.1 to 3.3 Vdc

Input/Output Low State: <0.9 Vdc

Output High State: 3.3 V (no load)

Drive Current: 220  $\mu$ A @ 2.7 Vdc

Maximum Input Voltage: 4 Vdc

### HALF BRIDGE MEASUREMENTS:

Accuracy: Relative to the excitation.

Using +2.5 Vdc excitation, is  
 $\pm(0.06\%$  of reading + 2.4 mV)/(2.5 Vdc)

### PERIOD AVERAGING (SE1 TO SE4):

Maximum Input Voltage: 4 Vdc

Frequency Range: 0 to 150 kHz

Voltage Threshold: counts cycles on transition  
from <0.9 Vdc to >2.1 Vdc

### EXCITATION CHANNELS (VX1 AND VX2):

Range: Programmable 0, 2.5, 5 Vdc, or  
off (floating)

Accuracy:  $\pm 25$  mV on +2.5 Vdc range,  $\pm 125$  mV  
on +5.0 Vdc range

Maximum Current: 25 mA on +2.5 Vdc range,  
10 mA on +5.0 Vdc range

## CONTROL PORTS (C1 AND C2)

### DIGITAL I/O:

Voltage Level When Configured as Input:  
<0.9 Vdc (low state) to >2.7 Vdc (high state)

Voltage Level When Configured as Output:  
0 V (low state), 5 Vdc (high state) (no load)

Logic Level: TTL

Drive Current: 1.5 mA @ 4.5 V

SDI-12: SDI-12 sensors connect to C1

## PULSE COUNTERS

### SWITCH CLOSURE (P\_SW):

Maximum Count Rate: 100 Hz

Minimum Switch Open Time: 5 ms

Minimum Switch Closed Time: 5 ms

Maximum Bounce Time: 4 ms

### PULSE COUNT (P\_SW, C1, AND C2):

Voltage Threshold: count on transition from  
<0.9 V to >2.7 Vdc

Minimum Pulse Width: 320  $\mu$ s

Maximum Input Frequency: 1 kHz

Max Input Voltage: C1 & C2 (6.5 V), P\_SW (4 Vdc)

### LOW LEVEL AC (P\_LL):

Voltage Threshold: <0.5 V to >2 V

Minimum Input: 20 mV RMS

Maximum Frequency: 1 kHz

Maximum Input:  $\pm 20$  V

Note: C1 and C2 can be used for switch closure  
using the battery voltage and a 100 kOhm  
pull-up resistor. If the dc offset is >0.5 V, then  
AC coupling is required.

## COMMUNICATIONS

SERIAL INTERFACE: Female RS-232 9-pin  
interface for logger-to-PC communications

### ON-BOARD SPREAD SPECTRUM RADIO:

Frequency: 915 MHz (CR206X),  
922 MHz (CR211X), or 2.4 GHz (CR216X)

Transmission Range: 1 mile with 0 dBd  $\frac{1}{4}$  wave  
antenna (line-of-sight) and 900 MHz radios;  
0.6 miles (1 km) with 0 dBd  $\frac{1}{2}$  wave antenna  
(line-of-sight) and 2.4 GHz radio;  
up to 10 miles with higher gain antenna  
(line-of-sight)

RF4XX used as a base station radio

Transmitter Power Output:  
250 mW (CR206X, CR211X);  
50 mW (CR216X)

### AVAILABLE RADIO TRANSMISSION MODES:

Always on, program controlled

Cycle Time: 1 or 8 s cycles; on for 100 ms every  
period; checks for incoming communication

Scheduled Transmission Time: off until transmis-  
sion time

PAkBUS® packet switching network protocol

## CLOCK ACCURACY

8.2 minutes/month @ -40° to +50°C; 1 minute/month  
@ +25°C

## CPU AND STORAGE

FINAL STORAGE: 512 kB flash memory, data  
format is 4 Bs per data point

INTERMEDIATE STORAGE: 8 kB SRAM

COMPILED PROGRAM STORAGE: up to 19.2 kB  
flash memory depending on structure of CRBasic  
program

OPERATING SYSTEM: 106 kB flash memory

FASTEST SCAN RATE: once per second

## SWITCHED BATTERY (SW BATTERY)

Switched under program control. Thermal fuse  
hold current = 670 mA @ -40°C; 500 mA @ 20°C;  
290 mA @ 70°C

## POWER

BATTERY VOLTAGE RANGE: 7 to 16 Vdc  
(can program datalogger to measure internal  
battery voltage)

MAXIMUM CONTINUOUS BATTERY CHARGING  
CURRENT:

0.9 A @ 20°C; 0.65 A @ 50°C

RECOMMENDED BATTERIES: 12 Vdc, 7 Ah or  
smaller sealed rechargeable battery when con-  
nected to the on-board charging circuit. Using larger  
batteries with the datalogger's built-in charger may  
result in excessive PC board heating. This is  
especially a concern when the battery is deeply  
discharged or failing with a shorted cell.

Alkaline cells, lithium, or other non-rechargeable  
battery types may be connected if the charging  
circuit is not used (i.e., nothing connected to  
Charge terminals).

CHARGER INPUT VOLTAGE: 16 to 22 Vdc

SOLAR PANEL: 10 W or smaller when using  
on-board charging circuit.

WALL CHARGER: 1 A or smaller when using on-  
board charging circuit.

SHELF LIFE OF CLOCK'S BACKUP BATTERY:  
5 years

## CURRENT DRAIN (@ 12 V)

QUIESCENT CURRENT DRAIN:

No Radio or Radio Powered Off:  $\sim 0.2$  mA

ACTIVE CURRENT DRAIN:

No radio  $\sim 3$  mA

Radio receive  $\sim 20$  mA (CR206X, CR211X),  
 $\sim 36$  mA (CR216X)

Radio transmit  $\sim 75$  mA (CR206X, CR211X,  
CR216X)

AVERAGE CONTINUOUS CURRENT DRAIN:

Radio always on  $\sim 20$  mA (CR206X, CR211X),  
 $\sim 36$  mA (CR216X)

Radio in 1 s duty cycle  $\sim 2.2$  mA (CR206X,  
CR211X),  $\sim 4$  mA (CR216X)

Radio in 8 s duty cycle  $\sim 0.45$  mA (CR206X,  
CR211X),  $\sim 0.8$  mA (CR216X)

## CE COMPLIANCE (as of 10/15)

CE COMPLIANT DATALOGGERS: CR200X

STANDARD(S) TO WHICH CONFORMITY IS  
DECLARED: IEC61326:2002

## EMI AND ESD PROTECTION

IMMUNITY: Meets or exceeds following standards:  
ESD: per IEC 1000-4-2;  $\pm 8$  kV air,  $\pm 4$  kV contact  
discharge

RF: per IEC 1000-4-3; 3 V/m, 80-1000 MHz

EFT: per IEC 1000-4-4; 1 kV power, 500 V I/O

Surge: per IEC 1000-4-5; 1 kV power and I/O

Conducted: per IEC 1000-4-6; 3 V 150 kHz-80 MHz

Emissions and immunity performance criteria avail-  
able on request.

## PHYSICAL

CASE DESCRIPTION: Aluminum with spring-loaded  
terminals

DIMENSIONS (including terminals):

14.0 cm x 7.6 cm x 5.1 cm; 5.5 in x 3 in x 2 in

WEIGHT:

CR200X or CR295X: 242 g (8.5 oz)

CR206X, CR211X, or CR216X: 271 g (9.5 oz)

CUSTOM CASE: available for OEM applications;  
contact Campbell Scientific

## WARRANTY

Three year covering parts and labor.