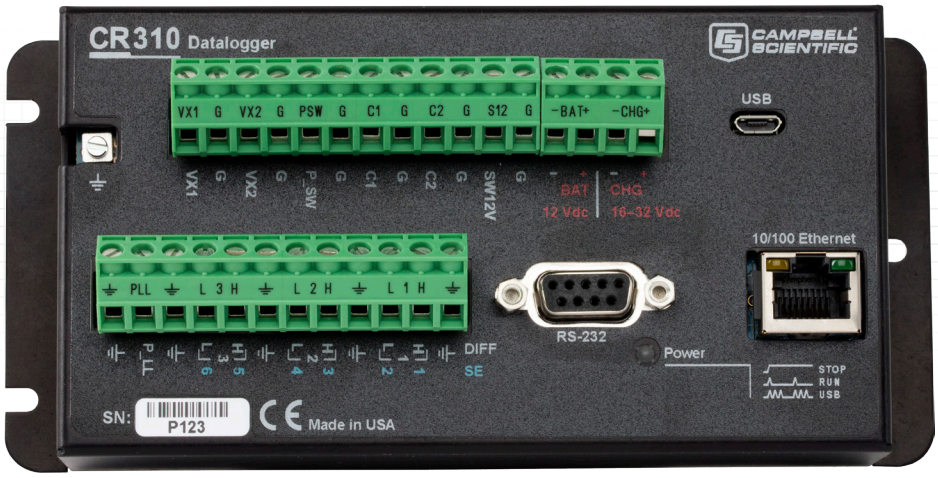
WHEN MEASUREMENTS MATTER

CR310

Measurement and Control Datalogger with Ethernet

Datalogger with Ethernet



Overview

The CR310 is a multi-purpose, compact measurement and control datalogger that includes an integrated 10/100 Ethernet port and removable terminal connectors. This entry level datalogger, with its rich instruction set, can measure most hydrological, meteorologi-cal, environmental and industrial sensors. It will concentrate data, making it available over varied networks and deliver it using your preferred protocol. The CR310 also performs automated on-site or remote decision making for control and M2M communications. The CR310 is ideal for small applications requiring long-term, remote monitoring and control.

Benefits and Features

- Setup easily with PC software and USB connectivity
- Measure with confidence, analog and digital sensors
- Internet ready—Email, FTP, HTTP/Web, TCP
- Trust in the Campbell Scientific quality including integral surge and ESD protection
- Save money and space using the integrated Ethernet port
- Network wirelessly to another node or Internet gateway with integrated radio option
- Wiring made easy through removable terminal block
- Communicate from anywhere when using a cellular or satellite peripheral
- Charge batteries using the integrated 12 V-battery solar-charge regulator
- Measure smart sensors using RS-232 or SDI-12
- Connect with PakBus, Modbus, DNP3, GOES, and other standard communication protocols
- Analyze and control with programmability and multiple general purpose I/O
- Notify with event driven communications and physical outputs

General Specifications

- **CPU:** ARM Cortex M4, running at 144 MHz
- **Internal Memory:** 30 MB flash for data storage, 80 MB flash for CPU drive / programs, 2 MB flash for operating system
- **Clock Accuracy:** ±1 min per month
- **USB micro B** for direct connection to PC (limited power source during configuration), 2.0 full speed, 12 Mbps
- **10/100 Ethernet RJ45** for LAN connection
- **RS-232** for connecting RS-232 modems or serial sensors
- **Battery Terminal Pair (-BAT+)** for regulated 12 V power input or rechargeable 12 V VRLA for UPS mode
- **Charge Terminal Pair (-CHG+)** for 16 to 32 V from dc power converter or 12 or 24 V solar panel (10 W)

General Specifications Continued

- **Power Consumption @ 12 Vdc:** 1.5 mA (sleep), 5 mA (1 Hz scan with one analog measurement), 23 mA (active processor always on), 32 mA (Ethernet idle), 51 mA (Ethernet active)
- **One Switched 12 V Terminal (SW12V)** for powering sensors or communication devices, 1100 mA @ 20°C
- **Two Sensor Excitation or Continuous 0.15 to 5 V Terminal (VX1, VX2)** for sensor excitation or output control
- **Six Multipurpose Analog Input Terminals (SE1 - SE6)**
  - Analog functions (SE1 - SE6)
    - Analog inputs: 6 single-ended or 3 differential inputs with -100 to +2500 mV and ±34 mV ranges 24 bit ADC
    - 4 to 20 mA or 0 to 20 mA inputs (SE1, SE2 only)
  - Digital I/O functions (SE1 - SE4) consist of 3.3 V logic levels for:
    - High frequency counter (35 kHz)
    - Pulse width modulation
    - Interrupts and timer input
    - Period average (200 kHz, amplitude dependent)
- **Two Pulse Counting Terminals (P_SW, P_LL)**
  - P_SW
    - Switch closure (150 Hz)
    - High frequency counter (35 kHz)
  - P_LL
    - Low level ac (20 kHz)
    - High frequency counter (20 kHz)
- **Two Control Terminals (C1, C2):** C terminals are software configurable for digital functions
  - Digital I/O functions consist of 5 V output and 3.3 V input logic levels for:
    - SDI-12
    - High frequency counter (3 kHz)
    - Switch closure (150 Hz)
    - General status/control
    - Voltage source 5 V: 10 mA @ 3.5 V
    - Interrupts
    - Serial asynchronous communication Tx/Rx pair
- **Best Analog Accuracy:** ±(0.04% of reading ±6 µV), 0° to 40°C
- **Best Effective Resolution:** 0.23 µV (±34 mV range, differential measurement, input reversal, 50/60 Hz f_{N1})
- **Operating Temperature Range:** -40° to +70°C
- **Weight**
  CR310: 288 g (0.64 lb)
  CR310-WIFI/RF407/412/422: 306 g (0.68 lb)
- **Dimensions:** 16.2 x 7.6 x 5.7 cm (6.4 x 3.0 x 2.3 in)

Terminal Functions

Each terminal may only take on one function.

Analog Input Function	C1	C2	P_SW	P_LL	VX1	VX2	SE1	SE2	SE3	SE4	SE5	SE6	RS-232	SW12	Ethernet	Max
Single Ended Voltage							✓	✓	✓	✓	✓	✓				6
Differential Voltage							H	L	H	L	H	L				3
4 to 20 or 0 to 20 mA							✓	✓								2
Analog Output Function	**C1**	**C2**	**P_SW**	**P_LL**	**VX1**	**VX2**	**SE1**	**SE2**	**SE3**	**SE4**	**SE5**	**SE6**	**RS-232**	**SW12**	**Ethernet**	**Max**
Switched-Voltage Excitation					✓	✓										2
5 V Source	✓	✓			✓	✓										4
12 V Source														✓		1
Digital I/O Function	**C1**	**C2**	**P_SW**	**P_LL**	**VX1**	**VX2**	**SE1**	**SE2**	**SE3**	**SE4**	**SE5**	**SE6**	**RS-232**	**SW12**	**Ethernet**	**Max**
RS-232 ± 6 V out													✓			1
RS-232 0-5 V out	Tx	Rx														1
SDI-12	✓	✓														2
Pulse-Width Modulation							✓	✓	✓	✓						4
Timer Input							✓	✓	✓	✓						4
Period Average							✓	✓	✓	✓						4
Interrupt	✓	✓					✓	✓	✓	✓						6
General I/O	✓	✓	✓				✓	✓	✓	✓						7
10/100 Ethernet, non-POE															✓	1
Pulse Counting Function	**C1**	**C2**	**P_SW**	**P_LL**	**VX1**	**VX2**	**SE1**	**SE2**	**SE3**	**SE4**	**SE5**	**SE6**	**RS-232**	**SW12**	**Ethernet**	**Max**
Switch Closure	✓	✓	✓													3
High Frequency	✓	✓	✓	✓			✓	✓	✓	✓						8
Low Level AC				✓												1

CR310-WIFI Specifications

Wireless Local Area Network (WLAN)

- **Operational Modes:** Client or Access Point
- **Supported Standards:** EEE 802.11 b/g/n, IEEE 802.11d/e/i, 802.1X, WEP, WPA/WPA2-Personal and Enterprise
- **Maximum Possible Over-the-Air Data Rates**
  - 802.11b: up to 11 Mbps
  - 802.11g: up to 54 Mbps
  - 802.11n: up to 72 Mbps
- **Operating Frequency:** 2.4 GHz, 20 MHz bandwidth
- **Antenna Connector:** RPSMA
- **Antenna:** pn 16005 unity gain (0 dBd), 1/2 wave whip, omnidirectional with articulating knuckle joint for vertical or horizontal orientation.
- **Transmit Power:** 7 to 18 dBm (5 to 63 mW)
- **Rx Sensitivity:** -97 dBm

Average Additional Current Contribution @ 12 Vdc

- **Client Mode:** 7 mA idle, 70 mA communicating
- **Access Point Mode:** 62 mA idle, 65 mA communicating
- **Sleep (disabled using IPNetPower() or DevConfig setting):** <0.1 mA

CR310-RF407, CR310-RF412 Specifications

Frequency Hopping Spread Spectrum Radios (FHSS)

- **Transmit**
  - Output Power: 5 to 250 mW, user selectable
  - Frequency
    - RF407: 902 to 928 MHz (US, Canada)
    - RF412: 915 to 928 MHz (Australia, New Zealand)
  - Channel Capacity
    - RF407: Eight 25-channel hop sequences sharing 64 available channels
    - RF412: Eight 25-channel hop sequences sharing 31 available channels
  - RF Data Rates: 200 kbps
- **Receive Sensitivity:** -101 dBm
- **Antenna Connector:** RPSMA

Average Additional Current Contribution @ 12 Vdc

- **Transmit:** 45 mA
- **Idle On:** 12 mA
- **Idle 0.5 s Power Mode:** 4 mA
- **Idle 1 s Power Mode:** 3 mA
- **Idle 4 s Power Mode:** 1.5 mA

Compliance Information

- **CR310-RF407**
  - United States: FCC Part 15.247: MCQ-XB900HP
  - Industry Canada: IC: 1846A-XB900HP
- **CR310-RF412**
  - ACMA RCM
  - United States: FCC Part 15.247: MCQ-XB900HP
  - Industry Canada: IC: 1846A-XB900HP

CR310-RF422 Specifications

F868 MHz SRD 860 Radio with Listen Before Talk (LBT) and Automatic Frequency Agility (AFA)

- **Transmit**
  - Output Power: 2 to 25 mW, user selectable
  - Frequency: 863 to 870 MHz (European Union)
  - Channel Capacity: 30 channels (default), software configurable for meeting local regulations; 10 sequences for reducing interference through channel hop
  - RF Data Rates: 10 kbps
- **Receive Sensitivity:** -106 dBm
- **Antenna Connector:** RPSMA (external antenna required)

Average Additional Current Contribution @ 12 Vdc

- **Transmit:** 20 mA
- **Idle On:** 9.5 mA
- **Idle 0.5 s Power Mode:** 3.5 mA
- **Idle 1 s Power Mode:** 2.5 mA
- **Idle 4 s Power Mode:** 1.5 mA