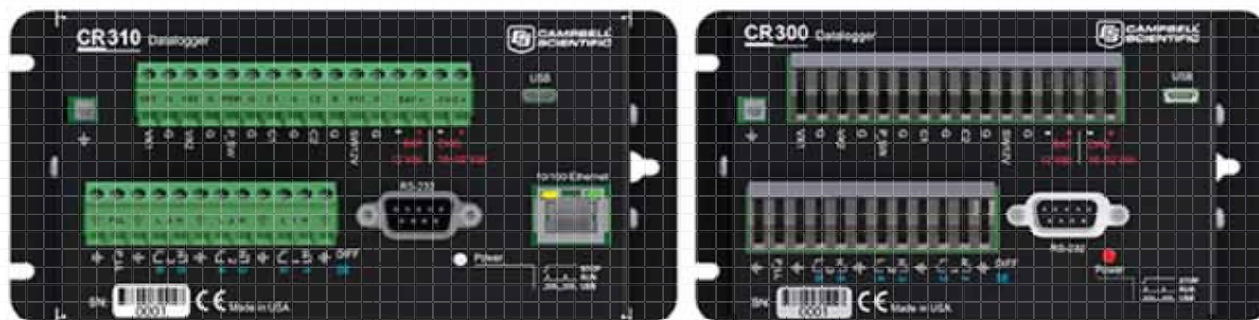## CR300-Series
Measurement and Control Datalogger

Compact Dataloggers
Ideal for small applications

Overview

The CR300 and CR310 are multi-purpose, compact, low-cost measurement and control dataloggers that are ideal for small applications requiring long-term, remote monitoring and control. These entry-level dataloggers, with their rich instruction set, can measure most hydrological, meteorological, environmental and industrial sensors. They will concentrate data, making the data available over varied networks and deliver the data using your preferred protocol. The CR300-series dataloggers also perform automated on-site or remote decision making for control and M2M communications.

The CR310 is longer than the CR300 and includes an integrated 10/100 Ethernet port and removable terminal connectors.

Benefits and Features

› Setup easily with computer 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

› Network wirelessly to another node or Internet gateway with integrated radio or integrated cellular option

› Integrated cellular option offers easier setup and lower current draw than external cellular modems

› Integrates seamlessly and reliably with Campbell Scientific cellular data plans and Konect Global Data Services

› Communicate from anywhere when using a satellite peripheral

› Charge batteries using the integrated 12 V-battery 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

› Save money and space with the CR310 integrated Ethernet port

› Wiring made easy through the CR310 removable terminal block

General Specifications

CPU: ARM Cortex M4, running at 144 MHz

Internal Memory[a]: 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 computer (limited power source during configuration), 2.0 full speed, 12 Mbps

RS-232 for connecting RS-232 modems or serial sensors

[a]Internal memory is for CR300s with serial numbers ≥ 2813 and CR310s

› **10/100 Ethernet RJ45** for LAN connection (CR310 only)

› **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)

› **Power Consumption @ 12 Vdc:** 1.5 mA (sleep), 5 mA (1 Hz scan with one analog measurement), 23 mA (active processor always on), 23 mA (CR310 Ethernet idle), 51 mA (CR310 Ethernet active)

General Specifications Continued

› **View EU Declaration of Conformity Document at:** www.campbellsci.com/cr300 or www.campbellsci.com/cr310

› **One Switched 12 V Terminal (SW12V)** for powering sensors or communication devices, 1100 mA @ 20℃[b]

› **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)

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[b] *1100 mA voltage output is for CR300s with serial numbers ≥ 2813 and CR310s*

› **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℃

› **Best Effective Resolution:** 0.23 μV (±34 mV range, differential measurement, input reversal, 50/60 Hz f_{N1})

› **Operating Temperature Range:** -40° to +70℃

› **Weight**
  CR300: 242 g (0.53 lb)
  CR300-CELL2XX/RF4XX/WIFI: 249.5 g (0.55 lb)
  CR310: 288 g (0.64 lb)
  CR310-CELL2XX/RF4XX/WIFI: 306 g (0.68 lb)

› **Dimensions:**
  CR300: 13.97 x 7.62 x 4.56 cm (5.5 x 3.0 x 1.8 in)
  CR310: 16.26 x 7.62 x 5.68 cm (6.4 x 3.0 x 2.2 in)

Terminal Functions

Analog Input	C1	C2	P_SW	P_LL	VX1	VX2	SE1	SE2	SE3	SE4	SE5	SE6	RS-232	SW12V	Ethernet	Max
Single Ended Voltage							✓	✓	✓	✓	✓	✓				6
Differential Voltage							H	L	H	L	H	L				3
Ratiometric Bridge							✓	✓	✓	✓	✓	✓				6
Thermocouple							✓	✓	✓	✓	✓	✓				6
Current Loop							✓	✓								2
Period Average							✓	✓	✓	✓						4
Analog & Voltage Output[c]	**C1**	**C2**	**P_SW**	**P_LL**	**VX1**	**VX2**	**SE1**	**SE2**	**SE3**	**SE4**	**SE5**	**SE6**	**RS-232**	**SW12V**	**Ethernet**	**Max**
Switched-Voltage Excitation					✓	✓										2
3.3 Vdc			✓		✓	✓	✓	✓	✓	✓						7
5 Vdc	✓	✓			✓	✓										4
12 Vdc														✓		1
Communications/Digital I/O	**C1**	**C2**	**P_SW**	**P_LL**	**VX1**	**VX2**	**SE1**	**SE2**	**SE3**	**SE4**	**SE5**	**SE6**	**RS-232**	**SW12V**	**Ethernet**	**Max**
SDI-12	✓	✓														2
RS-232													✓			1
RS-232 0-5 V out	Tx	Rx														1
GPS Time Sync	✓	✓					✓	✓	✓							5
GPS NMEA Sentences	Rx	Rx											Rx			3
General I/O	✓	✓	✓				✓	✓	✓	✓						7
Pulse-Width Modulation							✓	✓	✓	✓						4
Interrupt	✓	✓					✓	✓	✓	✓						6
10/100 Ethernet, non-POE															CR310 only	1
Pulse Counting	**C1**	**C2**	**P_SW**	**P_LL**	**VX1**	**VX2**	**SE1**	**SE2**	**SE3**	**SE4**	**SE5**	**SE6**	**RS-232**	**SW12V**	**Ethernet**	**Max**
Switch Closure	✓	✓	✓													3
High Frequency	✓	✓	✓	✓			✓	✓	✓	✓						8
Low Level AC				✓												1

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[c] *SE 1 to SE4, P_SW, C1, and C2 have limited drive capacity.*

–CELL200, –CELL205, and –CELL210 Options Specifications

Wide Area Network (WAN)

> **Cell Technology**
> - CELL200: 3G, 2G (GSM/GPRS/EDGE)
> - CELL205: 4G (LTE Cat1) with automatic 3G (UMTS/HSPA+) fallback
> - CELL210: 4G (LTE Cat1)

> **Market**
> - CELL200: International (confirm modem compliance for country/carrier where services are needed)
> - CELL205: North America; AT&T, T-Mobile (not Verizon)
> - CELL210: United States; Verizon only

> **Frequency Bands (MHz)**
> - CELL200
>   - UMTS/HSPA+ (3G): 800, 850, 900, 1900, 2100
>   - GSM/GPRS/EDGE (2G): 850, 900, 1800, 1900
> - CELL205
>   - LTE Cat1 (4G): 700, 850, 1700/2100 (AWS-1), 1900
>   - UMTS/HSPA+ (3G): 850, 1700/2100 (AWS), 1900
> - CELL210 LTE Cat1 (4G): 700, 850, 1700, 1900, 2100

> **Maximum Data Rate Downlink**
> - LTE Cat 1 (4G): 10.2 Mbps
> - UMTS/HSPA+ (3G): 7.2 Mbps
> - GSM/GPRS/EDGE (2G): 236.8 kbps

> **Maximum Data Rate Uplink**
> - LTE Cat 1 (4G): 5.2 Mbps
> - UMTS/HSPA+ (3G): 5.7 Mbps
> - GSM/GPRS/EDGE (2G): 236.8 kbps

> **Antenna Connector:** SMA (external antenna required; for Campbell Scientific antennas, see www.campbellsci.com/order/cr300 or www.campbellsci.com/order/cr310)

> **SIM Slot:** Industry standard 3FF micro-SIM

Additional Current Contribution @ 12 Vdc

> **Idle (connected to network, no data transfer):**
> - Minimum: 2 mA
> - Average: 10 mA (CELL200), 14 mA (CELL205), 28 mA (CELL210)

> **TX / RX:**
> - Minimum: 20 mA
> - Average: 105 mA (CELL200), 75 mA (CELL205), 90 mA (CELL210)

CELL200 Compliance Information

> **View EU Declaration of Conformity Document at:**
> www.campbellsci.com/cr300 or www.campbellsci.com/cr310

–RF407, –RF412, and –RF427 Options 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)
>   - RF427: 902 to 907.5 MHz, 915 to 928 MHz (Brazil)
> - Channel Capacity
>   - RF407: Eight 25-channel hop sequences sharing 64 available channels
>   - RF412: Eight 25-channel hop sequences sharing 31 available channels
>   - RF427: Eight 25-channel hop sequences sharing 43 available channels
> - RF Data Rates: 200 kbps

> **Receive Sensitivity:** -101 dBm

> **Antenna Connector:** RPSMA (external antenna required; for Campbell Scientific antennas, see www.campbellsci.com/order/cr300 or www.campbellsci.com/order/cr310)

Average Additional Current Contribution @ 12 Vdc

> **Transmit:** < 80 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

> **RF407**
> - United States: FCC Part 15.247: MCQ-XB900HP
> - Industry Canada (IC): 1846A-XB900HP
> - Mexico IF: RCPDIXB15-0672-A2

> **RF412**
> - ACMA RCM
> - United FCC Part 15.247: MCQ-XB900HP
> - Industry Canada (IC): 1846A-XB900HP

> **RF427:** Brazil ANATEL standards in Resolution No. 506: 08335-17-10644

–RF422 Option 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

Compliance Information

〉 **View EU Declaration of Conformity Document at:**
  www.campbellsci.com/cr300 or www.campbellsci.com/cr310

–WIFI Option 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, 70 mA communicating

〉 **Sleep (disabled using IPNetPower() or DevConfig setting):** 4 mA

Compliance Information

〉 **United States FCC ID:** XF6-RS9113SB

〉 **Industry Canada (IC):** 8407A-RS9113SB

〉 **View EU Declaration of Conformity Document at:**
  www.campbellsci.com/cr300 or www.campbellsci.com/cr310

Note: The user is responsible for emissions if changing the antenna type or increasing the gain.