Campbell SCIENTIFIC

CR1000Xe

Measurement and Control Datalogger



Extraordinary Performance

Enhanced with additional serial I/O, power control, and MQTTS to Meteorological Data Management Systems like CampbellCloud™

Overview

The CR1000Xe provides measurement and control for a wide variety of applications. Its reliability and ruggedness make it an excellent choice for remote environmental applications including stations for hydrology and meteorology (HydroMet), solar resource assessment and monitoring (SRA/SRM), dams and mines (geotech), and broad research objectives for environmental systems.

The CR1000Xe is a low-powered device that measures analog and digital sensors, processes and stores measurements, and adapts to any communications link. It stores data and programs in non-volatile flash memory. The onboard programming language—common to all Campbell Scientific data loggers—allows users to create solutions perfectly tailored to the application.

This featured product was part of the Aconcagua expedition to install a weather station on South America's tallest peak. Learn more about the expedition on our Extreme Application Series: Aconcagua page.

Benefits and Features

- Operates in extreme environments with a standard operating range of -40° to +70°C and an extended operating range of -55° to +85°C (0–100% RH, non-condensing environment)
- Connects directly to a computer's USB port
- Captures quickly changing data values with fast analog measurement capabilities (300+ Hz)
- Differentiates even slight changes in data values with higher-resolution measurements (24 bit Adc)
- Includes two non-isolated current input channels for directly connecting sensors with 0-to-20 mA or 4-to-20 mA current outputs
- Contains an onboard CPI port for hosting Campbell Scientific high-speed sensors and distributed modules (such as the GRANITE™ Series)
- Directly connects to Ethernet
- Includes microSD card drive for extended memory requirements
- Provides simple serial sensor integration and measurement with SDI-12, RS-232, RS-422, and/or RS-485
- Supports full PakBus networking
- Includes embedded web page for direct connection via web browser
- Offers a broad input voltage range of 10 to 36 Vdc
- Provides regulated 12 Vdc power output
- Controls CS I/O power to external modems

Detailed Description

The CR1000Xe electronics are shielded from radio frequency by a unique, sealed, stainless-steel canister. It includes a low-drift, battery-backed clock that can be updated by NTP, GPS, and Campbell Scientific's PakBus®. The canister and wiring panel seal together through stainless-steel connectors. The CPI and Ethernet pins are gold coated to resist corrosion. The CR1000Xe is compatible with 12 V- and 24 V-nominal systems. The data logger's wiring panel regulates 12 V outputs and includes two switchable 12 V outputs on removable terminal blocks and a switchable 12 V output on CS I/O.

Specifications

Operating Temperature Range	❱ -40° to +70°C (standard) ❱ -55° to +85°C (extended)
Storage Temperature Range	-60° to +85°C
Operating Humidity	0–100% RH, non-condensing environment
Maximum Scan Rate	1000 Hz
Case Material	Anodized aluminum
Analog Inputs	16 single-ended or 8 differential (individually configured). Two analog inputs can measure 4 to 20 mA or 0 to 20 mA natively.
Pulse Counters	10 (P1 to P2 and C1 to C8)
Voltage Excitation Terminals	4 (VX1 to VX4)
Maximum Source/Sink Current	❱ ±40 mA (voltage excitation) ❱ 50 mA (regulated 3.3 or 5 V)
Communications Ports	❱ USB-C ❱ Ethernet ❱ RS-232 ❱ RS-485 ❱ CS I/O ❱ RS-422 ❱ CPI
Data Storage Slots	microSD
Switched 12 Volt	2 terminals, plus CS I/O pin 8
Digital I/O	8 terminals (C1 to C8) configurable for digital input and output. Includes status high/low, pulse width modulation, external interrupt, edge timing, switch closure pulse counting, high-frequency pulse counting, plus UART, RS-232, RS-485, SDM, SDI-12, I2C, and SPI serial-communications functions. Terminals are configurable in pairs for 5 V or 3.3 V logic for some functions.
Input Limits	±5 V
Analog Voltage Accuracy	❱ Accuracy specifications do not include sensor or measurement noise. ❱ ±(0.08% of measurement + offset) at -55° to +85°C (extended temperature range) ❱ ±(0.06% of measurement + offset) at -40° to +70°C ❱ ±(0.04% of measurement + offset) at 0° to 40°C
ADC	24-bit
Power Requirements	10 to 36 Vdc input
Real-Time Clock Accuracy	±3 min. per year (optional GPS correction to ±10 µs)
Internet Protocols	Ethernet, PPP, RNDIS, ICMP/Ping, Auto-IP (APIPA), IPv4, IPv6, UDP, TCP, TLS (v1.2), DNS, DHCP, SLAAC, Telnet, HTTP(S), SFTP, FTP(S), POP3/TLS, NTP, SMTP/TLS, SNMPv3, CS I/O IP, MQTT(S)
Communications Protocols	CPI, PakBus, SDM, SDI-12, Modbus, TCP, DNP3 outstation, UDP, NTCIP, NMEA 0183, I2C, SPI, CampbellCloud HTTPS/MQTTS, and others
Battery-Backed SRAM for CPU Usage and Final Storage	4 MB
Data Storage	4 MB SRAM + 72 MB flash (storage expansion of up to 16 GB with removable microSD flash memory card)
Idle Current Drain, Average	< 2.0 mA (@ 12 Vdc)
Active Current Drain, Average	❱ 57 mA (20 Hz scan @ 12 Vdc) ❱ 1.1 mA (1 Hz scan @ 24 Vdc) ❱ 2 mA (1 Hz scan @ 12 Vdc)
Dimensions	23.8 x 10.1 x 6.2 cm (9.4 x 4.0 x 2.4 in.) Additional clearance required for cables and wires

Weight	0.86 kg (1.9 lb)

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784 | (435) 227-9120 | www.campbellsci.com
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