

<u>CR</u>6

Measurement and Control Datalogger

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Multi-Purpose Datalogger



The CR6:

Flexibility - adapt it to your project's exact needs.

Measurement Quality - trust your data.

Performance - get the speed and responsiveness you need.

Integration - benefit from lots of functionality in compact package.

Rugged & Reliable - count on it to work—for years.

One Datalogger, Unlimited Applications

The flexibility of the CR6 in terms of sensor compatibility, communications, supported protocols, and power options make it a great fit for a variety of applications.

Features and Benefits

- Powerfully versatile, multi-tool of data acquisition
- > U terminals configurable to what you want them to be: analog or digital, input, or output
- > Static vibrating wire measurements using our patented spectral analysis
- > 24-bit A/D sigma delta converter provides 24 effective bits of resolution
- Surge and overvoltage protection on all terminals
- > Flexible power input from solar panel, dc power supply, 12 V battery, USB
- Onboard communication via Ethernet 10/100
- > Wiring made easy through removable terminal blocks
- MicroSD card drive for extended memory requirements
- Serial sensors support with RS-232 and RS-485 native
- > CPI for hosting Campbell high speed sensors and distributed modules (CDM)
- [>] Programmable with CRBasic or SCWin program generator, completely PakBus compatible
- > Shared operating system (OS) with the popular CRBasic CR1000 and CR3000 dataloggers



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CR6 Essentials

Power ⊢



Unsurpassed Flexibility

Our most flexible datalogger ever, the CR6, gives you more flexibility in measurements, communications, and input power. If you could only have one data acquisition and control device, this is the one to have.

Universal Terminals

Universal (U) terminals have liberated data acquisition. Under program control, U terminals may take on the role of analog inputs or outputs to read virtually any analog sensor. When configured as a digital I/O, they can communicate with smart sensors, resolve frequency, or drive relays or VFDs. Static vibrating-wire measurements are also possible.

Configurable Control and Relay Terminals

The C and SW12 terminals complement the U terminals. SW12 terminals provide higher current 12 V switches for turning on and off telecommunication or other devices. The C terminals add four more terminals that can function as digital I/O. They also support RS-485 sensors.

CR6 Terminal Configurations

Analog Input																	
Function	C1	C2	C3	C4	U1	U2	U3	U4	U5	U6	U7	U8	U9	U10	U11	U12	Max
Single Ended					x	x	x	х	x	x	x	х	x	x	x	х	12
Differential					H/L		H/L		H/L		H/L		H/L				6
Period Average					x	х	x	х	х	х	x	х	x	x	x	х	12
Vibrating Wire					x		x		х		х		x		х		6
Thermistor					х		х		х		х		x		x		6
Analog Output	g Output																
Function	C 1	C2	C3	C4	U1	U2	U3	U4	U5	U6	U7	U8	U9	U10	U11	U12	Мах
Switched Voltage Excitation					х	х	x	х	х	х	x	х	x	x	x	х	12
Switched Current Excitation					x	х	x	х	х	х	x	х	x	x	x	x	12
Digital I/O																	
Function	C1	C2	C3	C4	U1	U2	U3	U4	U5	U6	U7	U8	U9	U10	U11	U12	Мах
RS-232	Tx/Rx		Tx/Rx														2
RS-485 (Half Duplex)	A(tx/rx+)	B(tx/rx-)	A(tx/rx+)	B(tx/rx-)													2
RS-485 (Full Duplex)	A(Tx+)	B(Tx-)	A(RX+)	B(Rx-)													1
RS-232 TTL	Tx/Rx		Tx/Rx		Tx/Rx		Tx/Rx		Tx/Rx		Tx/Rx		Tx/Rx		Tx/Rx		8
SDI-12	x		x		x		x		х		x		x		x		8
SDM	DATA	CLK	ENABLE		DATA	CLK	ENABLE		DATA	CLK	ENABLE		DATA	CLK	ENABLE		1
General I/O Pair	x	x	x	х	х	х	x	х	х	х	x	х	x	x	x	х	16
5 V or 3.3 V Source	x	x	x	х	x	х	x	x	x	x	x	х	x	x	x	х	16
Pulse Width Modulation	x	x	x	х	x	х	x	х	х	х	x	х	x	x	x	х	16
Timer I/O	x	x	x	x	х	x	x	х	х	x	x	х	x	x	x	х	16
Interrupt	x	x	х	х	х	х	x	х	x	х	x	х	x	x	x	x	16
Pulse Counting																	
Function	C1	C2	C3	C4	U1	U2	U3	U4	U5	U6	U7	U8	U9	U10	U11	U12	Мах
Switch Closure	x	х	х	х	х	х	х	х	х	х	x	х	x	х	x	x	16
High Frequency	x	х	х	х	х	х	х	х	х	х	x	х	x	x	x	x	16
Low Level AC						х		х		х		х		х		х	6

No terminal type constraints: Gone are the terminal designators Pulse (P), Voltage excitation (Vx), Current excitation (Ix), or SDI-12. U terminals conform to project needs through program assignment.

Project changes: Universal terminals can absorb system dynamics. If measurements need to be added to the sensor suite, you can do it as long as a U terminal pair is available—independent of sensor type. **Datalogger reuse:** The same CR6 can be used for very different projects. For example, a CR6 used for short-term bridge monitoring can later be used for an agricultural research weather station with very different sensor requirements.

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Power Source Options

The CR6 can be powered in a variety of ways and with smart power management, will use the highest of the input voltage sources.



UPS with Solar Panel

A 12 V VRLA battery powers the CR6 while being cycle charged by a 12 or 24 V solar panel through the CR6 regulator. 30 W solar panels or smaller and 7 to 24 Ahr batteries are ideal.



UPS with ac to dc converter

A 12 V VRLA battery powers the CR6 and is trickle charged through the CR6 by a 16 to 32 Vdc source. Typical charge sources are ac to dc 24 Vdc power converters.



Battery only

For the lowest power mode, a quality 12 Vdc supply or battery connected to the BAT terminal powers the CR6. Valid dc voltages are between 12 and 16 Vdc.



Charge only

When a reliable 24 Vdc source is available, it can be used to power the CR6 through the CHG terminals.



USB

For configuration, programming, and testing convenience, the CR6 may be powered over USB. In this mode, 12 V functions are disabled and batteries will not charge.

Field-Friendly Wiring

The terminal blocks can be removed making the wiring process a lot easier. The blocks are ergo-nomically angled and lockable.

Initial wiring: Removing the terminal block may help match sensor leads to specific terminals and provide flexibility and space to wire.

Datalogger swapping: Every three years when the CR6 should be recalibrated, instead of unwiring the sensors, simply remove the terminal block and place it in a replacement CR6.



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New CPI Bus

The CAN Peripheral Interface (CPI) is a proprietary measurement bus that provides synchronized communication between the CR6 and a new line of modules and sensors. These new CDM modules and Campbell Scientific sensors add functionality to the CR6 as they operate in concert with the CR6 as a single measurement unit.

Distributed measurements: The CPI Bus uses CAN protocol over a twisted pair of the CAT5 cable to pass program specific settings to and receive remote measurements from CDM modules or Campbell Scientific sensors.

Speed: Bit rates as high as 1 Mbps allow several high speed CDMs to pass data over the Bus simultaneously.

Measurement synchronization: An RS-485 twisted pair cable carries a pulse marking the beginning of each scan. CDMs use this precision timing to remain synchronized to the CR6, to make measurements, and transmit unprompted data.

Specialized sensors and modules: Dynamic vibrating wire

measurements can easily be integrated into the CR6 through the CPI port. The modular design of the CDM-VW300 and CDM-VW305 analyzers allow them to be installed close to the sensor with one communication cable returning to the datalogger.

Versatile Communications Options





Powerful Programming Language

The CR6 uses the same operating systems and the same BASIC-like programming language as our current family of dataloggers.

Flexible programming: In a single program, measure different sensors at different scan rates, store data at different intervals, create event- or time-based control or measurements, and much more. CRBasic gives you the power to get exactly what you need from a system.

Program reuse: A CR800, CR1000, or CR3000 program or code snippet can be compiled for the CR6 facilitating migration to this new datalogger.

BeginProg Scan (1,Sec,3,0) PanelTemp (RefTemp,60Hz) TCDiff (Temp,1,mV200,1,TypeT,RefTemp,True,0,60Hz,1.0,0) NextScan SlowSequence Scan(10, sec, 1, 0) If AlarmTrigger = False Then If Temp > 28 Then AlarmTrigger = True If AlarmTrigger Then Message = "Warning! " + Temp + " degrees C." EmailSuccess=EmailSend(Server,To,From,Subject,Message... Endlf Endlf NextScan EndProg

Quality Analog Measurements

Several years of research and testing have created a datalogger with better accuracy and precision than any of its predecessors. Lab-grade measurements are achievable in the field, making this a must have datalogger for researchers.

24-bit measurements: 24 bits of effective resolution are achievable with the 24-bit A/D sigma-delta converter— surpassing even the CR3000 in measurement resolution.

Three analog ranges: Broad analog input ranges of $\pm 5 \text{ V}, \pm 1 \text{ V}$, or $\pm 200 \text{ mV}$ maximize the 24 bits over almost any sensor output. Accuracy of better than $\pm 0.025\%$ of reading is now possible in normal field operating conditions.

Filtering options: The sinc filter, adjustable from 5 Hz to 93 kHz (Fnotch), offers almost infinite filtering possibilities. Selecting lower frequencies will require more time for the measurement, but if speed is needed, the filter frequency may be increased.

Low noise: At 5 Hz Fnotch on the ± 200 mV range, better than ± 80 nV resolution is possible due to the low noise design of the CR6 analog input. Sensors with extremely low output voltage do not need external amplification.





High Performance, Low Power Use

Smart power management gives the CR6 the perfect balance of speed and extremely low input power.

High Performance

When required, the CR6 transforms into a high throughput data aggregator—converting data to engineering units while processing other measurements at incredible speeds.

32-Bit Processor: A new high performance processor with integrated floating point capability enables fast conversions and numeric processing as well as robust transfer of large data files. This also helps meet the higher bandwidth demands of encryption and IPV6.

Instant Website: An internal web server provides an instant, responsive website for IP enabled installations. The default web page can be customized and branded however you want to allow access to data display, configuration options, diagnostics, and security.



Low Power Use

High performance does not have to be at the expense of power.

Smart power management: Power is delivered only when needed. Minion architecture allows the CR6 to adjust its power consumption to the application. This architecture offloads simple routine tasks to minion, low-power co-processors while the CPU remains at standby for any high-speed data requests.

Low quiescent current drain: How low can you go with all of this functionality? Try less than 1 mA.





Big Functionality, Small Package

Functionality previously available only through add-on peripherals is now integrated into one of the smallest dataloggers Campbell Scientific has ever manufactured.

Integrated Functionality



The CR6 does the work of several external peripherals.

Power conditioning: You can connect a solar panel or other dc source directly to the CR6 with a rechargeable battery. No need for an external charger/regulator.

Card storage: Card slot allows up to 16 GB microSD industrial cards for storing more data, reducing site visits, and providing data redundancy.

Serial sensor support: Measure (RS-232 and RS-485 half or full duplex) serial sensors natively, without the cost of additional interfaces.

USB: USB port allows direct connection to a PC without a serial-to-USB dongle or other conversion device.

Vibrating wire: This is our first datalogger capable of doing static vibrating-wire measurements without a separate peripheral. Our patented spectral analysis identifies and eliminates unwanted measurement noise.

Ethernet 10/100: Ethernet port means no additional interface with the added benefit of faster throughput for large data files, encryption, and IPV6.

Wi-Fi: The Wi-Fi model supports the convenience of Wi-Fi communication without using additional hardware. Models with internal spread spectrum radio and cellular modems will be available soon.

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Compact Footprint

All of this integrated functionality didn't increase the size of the CR6. In fact, it's even smaller than the CR1000.



Rugged, Reliable Design

Shock and Vibration Tested: The robust case and electronic design passed the stringent criteria of MIL-STD 810G method 514.6 random vibration test for composite wheeled vehicles and 516.6 shock test for transit drop.

Nonvolatile memory, and battery-backed clock and memory: A lithium battery is used to retain clock and data when the CR6 is not powered. If GPS or NTP is not being used, the extremely accurate clock keeps time to within a few minutes per year. Non-volatile flash memory is used for storing programs, OS, and data redundancy. **Temperature Testing from -55°C to 85°C:** Every CR6 must pass an extreme performance test of proper operation and calibration over our extended temperature range.

Surge ESD and overvoltage protection: The CR6 has been designed to EMC directive 2004/108/EC and product standard BS EN 61326:2013 which ensures performance in difficult environments.





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