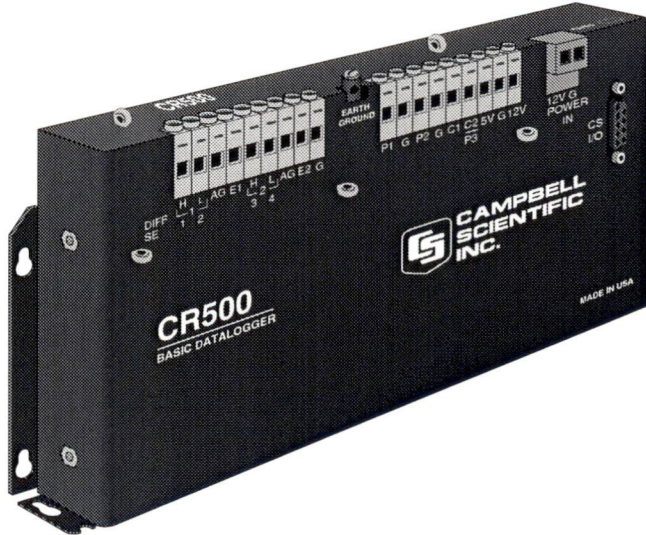


The CR500

Our Low-Cost Datalogger



The CR500 is designed for reliable, unattended long-term monitoring in harsh environments. The CR500 is based on the proven technology of the CR10(X). It has the same measurement accuracy but fewer channels. Data storage format and retrieval interfaces are the same as the CR10(X), 21X, and CR23X dataloggers, allowing seamless integration into existing networks.

Short Cut, our point-and-click program generator, makes programming the CR500 extremely simple. The user selects the scan rate, the sensors to measure, and how often to store the data. Short Cut then creates the datalogger program and a wiring diagram for the sensors. Load the program into the CR500, and you're ready to make measurements. View the measurements with a laptop computer (via SC32A Interface and PC200W software) or with our CR10KD Keyboard Display. Stored data are retrieved directly to a computer or over any of CSI's telecommunication links using PC208(W) Datalogger Support Software. Edlog support for the CR500 is available with PC208W 2.1 or greater.

Features

- Easy, point-and-click programming
- 2 differential or 4 single-ended analog inputs
- 3 pulse counting channels: 2 full function, 1 switch closure only
- SDI-12 compatible
- Non-volatile Flash memory to store up to 24,000 data points
- Digital output port for on/off control
- Operating Temperature Range: -25° to +50°C standard; -55° to +80°C extended
- 12 V power source; alkaline or rechargeable batteries; low power drain
- Supports all CSI telecommunication and data retrieval options
- Reduced cost
- 3-year warranty

Compatible Sensors

- all SDI-12 sensors
- conductivity sensors
- pressure transducers
- pH sensors
- shaft encoders
- turbidity sensors
- resistance tape water level sensors
- tipping bucket rain-gages
- ultrasonic water level sensors
- thermistors
- wind speed
- flow meters

Typical Applications

- stage recording and precipitation monitoring
- water level and voice call-out in irrigation systems
- water level in wells
- storm water monitoring, including initiating a sampler
- monitoring air temperature and precipitation
- minimum data sets for disease forecasting models

Note: The CR500 does not support multiplexers, SDM devices, thermocouple measurements, or wind vector calculation. For further information regarding compatible sensors, telemetry options, or system configuration, contact our applications engineers. For help with water resources applications call 435-750-9693; for help with agricultural or meteorological applications call 435-750-9691.



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CR500 Specifications

Electrical specifications are valid over a -25° to +50°C range unless otherwise specified; non-condensing environment required. To maintain electrical specifications, yearly calibrations are recommended.

PROGRAM EXECUTION RATE

System tasks initiated in sync with real-time up to 8 Hz. One measurement with data transfer is possible at this rate without interruption.

ANALOG INPUTS

NUMBER OF CHANNELS: 2 differential or up to 4 single-ended. Each differential channel can be configured as two single-ended channels.

RANGE AND RESOLUTION:

| Full Scale Input Range (mV) | Resolution (μ V) | |
|--------------------------------|-----------------------|--------------|
| | Differential | Single-Ended |
| ± 2500 | 333 | 666 |
| ± 250 | 33.3 | 66.6 |
| ± 25 | 3.33 | 6.66 |
| ± 7.5 | 1.00 | 2.00 |
| ± 2.5 | 0.33 | 0.66 |

INPUT SAMPLE RATES: Includes the measurement time and conversion to engineering units. The fast and slow measurements integrate the signal for 0.25 and 2.72 ms, respectively. Differential measurements incorporate two integrations with reversed input polarities to reduce thermal offset and common mode errors.

| | |
|------------------------------------|---------|
| Fast differential voltage: | 4.2 ms |
| Slow differential voltage: | 9.2 ms |
| Differential with 60 Hz rejection: | 25.9 ms |

ACCURACY: $\pm 0.1\%$ of FSR;
 $\pm 0.05\%$ of FSR, (0 to 40°C); (e.g., $\pm 0.1\%$ FSR = ± 5.0 mV for ± 2500 mV range)

INPUT NOISE VOLTAGE (for ± 2.5 mV range):

| | |
|---------------------------------------|------------------|
| Fast differential: | 0.82 μ V RMS |
| Slow differential: | 0.25 μ V RMS |
| Differential with 60 Hz rejection: | 0.18 μ V RMS |

COMMON MODE RANGE: ± 2.5 V.

DC COMMON MODE REJECTION: > 140 dB.

NORMAL MODE REJECTION: 70 dB (60 Hz with slow differential measurement).

INPUT CURRENT: ± 9 nA maximum.

INPUT RESISTANCE: 20 Gohms typical.

ANALOG OUTPUTS

DESCRIPTION: 2 switched excitations, active only during measurement, one at a time.

RANGE: ± 2.5 V

RESOLUTION: 0.67 mV

ACCURACY: ± 2.5 mV (0° to 40°C);
 ± 5 mV (-25° to +50°C)

CURRENT SOURCING: 25 mA

CURRENT SINKING: 25 mA

FREQUENCY SWEEP FUNCTION: The switched outputs provide a programmable swept frequency, 0 to 2.5 V square wave for exciting vibrating wire transducers.

RESISTANCE MEASUREMENTS

MEASUREMENT TYPES: The CR500 provides ratiometric bridge measurements of 4- and 6-wire full bridge, and 2-, 3-, and 4-wire half bridges. Precise dual polarity excitation using any of the switched outputs eliminates DC errors. Conductivity measurements use a dual polarity 0.75 ms excitation to minimize ionic depolarization errors.

ACCURACY: $\pm 0.02\%$ of FSR plus bridge resistive errors.

PERIOD AVERAGING MEASUREMENTS

DEFINITION: The average period for a single cycle is determined by measuring the duration of a specified number of cycles. Any of the 4 single-ended analog input channels can be used. Signal attenuation and AC coupling is typically required.

INPUT FREQUENCY RANGE: Signal centered around ground.

| Range Code | Min volts (peak-peak) @ Max. Freq.* | Max. Input Frequency |
|------------|-------------------------------------|----------------------|
| 1 | 2 mV | 8 kHz |
| 2 | 5 mV | 20 kHz |
| 3 | 12 mV | 40 kHz |
| 4 | 2000 mV | 150 kHz |

RESOLUTION: 35 ns divided by the number of cycles measured.

ACCURACY: $\pm 0.01\%$ of reading

TIME REQUIRED FOR MEASUREMENT: Signal period times the number of cycles measured plus 1.5 cycles + 2 ms.

PULSE COUNTERS

NUMBER OF PULSE COUNTER CHANNELS: 2 eight-bit or 1 sixteen-bit; software selectable as switch closure, high frequency pulse, or low-level AC. An additional channel (C2/P3) can be software configured to read switch closures at rates up to 40 Hz.

MAXIMUM COUNT RATE: 16 kHz, eight-bit counter; 250 kHz, sixteen-bit counter. Channels are scanned at 8 or 64 Hz (software selectable).

MODES: Switch closure, high frequency pulse, and low level AC.

SWITCH CLOSURE MODE

Minimum Switch Closed Time: 5 ms.
Minimum Switch Open Time: 6 ms.
Maximum Bounce Time: 1 ms open without being counted.

HIGH FREQUENCY PULSE MODE

Minimum Pulse Width: 1 μ s.
Maximum Input Frequency: 500 kHz.
Voltage Thresholds: Count upon transition from below 1.5 V to above 3.5 V.
Maximum Input Voltage: ± 20 V.

LOW LEVEL AC MODE

(Typical of magnetic pulse flow transducers or other low voltage, sine wave outputs.)

Input Hysteresis: 8 mV.

Maximum AC Input Voltage: 20 V RMS.

| Minimum AC Input Voltage (sine wave mV RMS)* | Range (Hz) |
|--|------------|
|--|------------|

| | |
|------|---------------|
| 20 | 1 to 1000 |
| 200 | 0.5 to 10,000 |
| 1000 | 0.3 to 20,000 |

*16-bit config. or 64 Hz scan req'd for freq. > 2048 Hz.

DIGITAL I/O PORTS

2 ports: Port C1 is software selectable as a binary input or control output. Port C2/P3 is input only and can be software configured as an SDI-12 port, a binary input, or as a switch closure counter (40 Hz max).

OUTPUT VOLTAGES (no load): high 5.0 V ± 0.1 V;
low < 0.1 V.

OUTPUT RESISTANCE: 500 ohms.

INPUT STATE: high 3.0 V to 5.5 V; low -0.5 V to 0.8 V.

INPUT RESISTANCE: 100 kohms.

SDI-12 INTERFACE STANDARD

DESCRIPTION: Digital I/O Ports C1-C2 support SDI-12 asynchronous communication; up to ten SDI-12 sensors can be connected to each port.

EMI and ESD PROTECTION

Emissions: Meets or exceeds the following standards.

Radiated: per EN 55022:1987 Class B

Conducted: per EN 55022:1987 Class B

Immunity: Meets or exceeds the following standards.

ESD: per IEC 801-2;1984 8kV air discharge

RF: per IEC 801-3;1984 3V/m, 27-500 MHz

EFT: per IEC 801-4;1988 1kV mains, 500V other

CPU AND INTERFACE

PROCESSOR: Hitachi 6303.

PROGRAM STORAGE: Up to 16K bytes for active programs and alternate program storage.

DATA STORAGE: 48K Flash standard (24,000 data values).

MEMORY: 128 K Flash and 32 K SRAM standard.

DISPLAY: 8 digit LCD (0.5" digits).

PERIPHERAL INTERFACE: 9 pin D-type connector for keyboard display, storage module, modem, printer, card storage module, and RS-232 adapter.

BAUD RATES: Selectable at 300, 1200, 9600 and 76,800. ASCII communication protocol is one start bit, one stop bit, eight data bits (no parity).

CLOCK ACCURACY: ± 1 minute per month.

SYSTEM POWER REQUIREMENTS

VOLTAGE: 9.6 to 16 volts.

TYPICAL CURRENT DRAIN: 1 mA quiescent, 13 mA during processing, and 46 mA during analog measurement.

BATTERIES: Any 12 volt battery can be connected as a primary power source. Several power supply options are available from Campbell Scientific.

PHYSICAL SPECIFICATIONS

SIZE: 8.4" x 1.5" x 3.9" - Additional clearance required for CSI serial I/O and sensor leads.

WEIGHT: 15 oz.

WARRANTY

Three years against defects in materials and workmanship.



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Printed September 1998