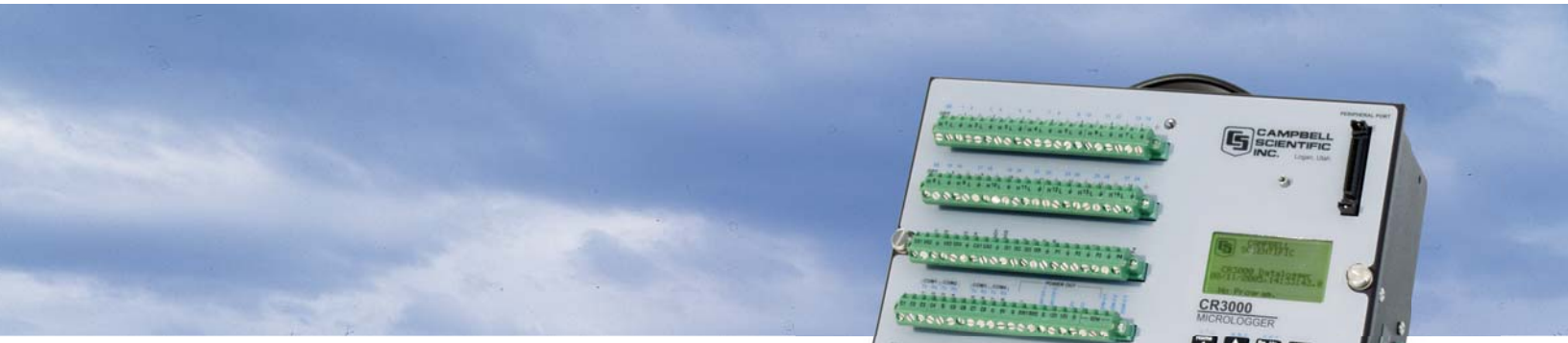
CAMPBELL SCIENTIFIC®

WHEN MEASUREMENTS MATTER



CR3000

Micrologger®

A Portable,

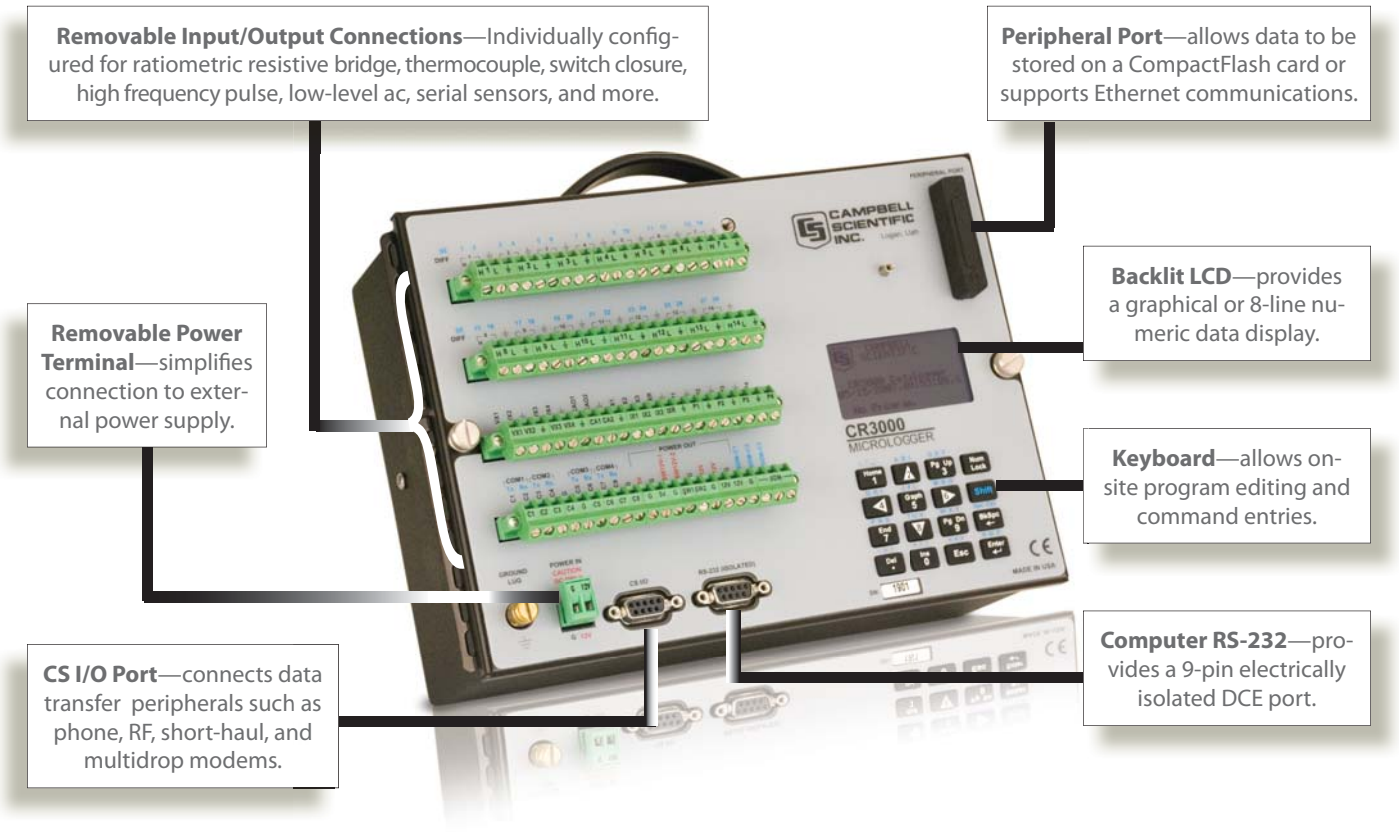
Rugged, Powerful

Data Acquisition

System

CR3000 Micrologger®

The CR3000 Micrologger® is a compact, rugged, powerful datalogger. Housed in a portable, self-contained package, the Micrologger consists of measurement and control electronics, communication ports, keyboard, display, power supply, and carrying handle. The CR3000's low power requirements allow extended field use from a dc voltage source.



Features

- Program execution rate of up to 100 Hz
- 16-bit analog to digital conversions
- 16-bit microcontroller with 32-bit internal CPU architecture
- Temperature compensated real-time clock
- Background system calibration for accurate measurements over time and temperature changes
- Gas Discharge Tube (GDT) protected inputs
- Data values stored in tables with a time stamp and record number
- 4 Mbytes data storage memory
- Battery-backed SRAM and clock that ensure data, programs, and accurate time are maintained while the CR3000 is disconnected from its main power source
- Serial communications with serial sensors and devices supported via I/O port pairs
- PakBus, Modbus, and DNP3 protocols supported

Operating System/Logic Control

The on-board operating system includes measurement, processing, and output instructions for programming the datalogger. The programming language, CRBasic, uses a BASIC-like syntax. Measurement instructions specific to bridge configurations, voltage outputs, thermocouples, and pulse/frequency signals are included. Processing instructions support algebraic, statistical, and transcendental functions for on-site processing. Output instructions process data over time and control external devices.

Data Storage Capacity

The CR3000 provides 2 Mbyte of FLASH memory for the Operating System and 4 Mbytes of battery-backed SRAM for CPU usage, program storage, and data storage. Data is stored in a table format. The storage capacity of the CR3000 can be increased by using a CompactFlash® card.

Input Output Terminals

Analog Inputs
Twenty-eight single-ended (14 differential) channels measure voltage levels with 16-bit resolution on five software selectable voltage ranges.

Pulse Counters
Four 24-bit pulse channels measure switch closures, high frequency pulses, or low-level ac.

Switched Excitation Outputs
Four switched voltage and three switched current outputs provide precision excitation for ratiometric sensor/bridge measurements.

Digital I/O Ports
Eight ports have multiple functions including digital control output, interrupt, pulse counting, switch closure, frequency/period measurements, edge timing, or SDI-12 communication. Three additional ports are dedicated for measuring SDM devices.

The I/O ports can be paired as transmit and receive. Each pair has 0 to 5 V UART hardware that allows serial communications with serial sensors and devices. An RS232-to-logic level converter may be required in some cases.

Continuous Analog Outputs
Two continuous analog outputs provide voltage levels to displays or proportional controllers.

Peripheral Port
One 40-pin port interfaces with the NL115 Ethernet Interface & CompactFlash Module, the NL120 Ethernet Interface, or the CFM100 CompactFlash Module.

RS-232 Port
The RS-232 port is for connecting a PC, serial sensor, or RS-232 modem. The PC attaches to the CR3000 via an RS-232 cable—no interface required. This port isolates the PC's electrical system from the datalogger, thereby protecting against ground loops, normal static discharge, and noise.

CS I/O Port
Many communication peripherals connect with the CR3000 via this port. A PC may also connect with this port, but an SC32B or SC-USB interface is required.

Power Connections
The continuous 5 V and 12 V terminals are for connecting sensors and non-Campbell Scientific peripherals. Two switched 12 V terminals are program controlled.

Transient Protection
Gas Discharge Tube (GDT) protects the inputs from electrical transients. The CR3000 is CE compliant under the European Union's EMC Directive, meeting ESD, EMC, Fast Transient standards.

Communication Protocols
The CR3000 supports the PakBus, Modbus, and DNP3 communication protocols. With the PakBus protocol,networks have the distributed routing intelligence to continually evaluate links. Continually evaluating links optimizes delivery times and, in the case of delivery failure, allows automatic switch over to a configured backup route.

The Modbus RTU protocol supports both floating point and long formats. The datalogger can act as a slave and/or master.

The DNP3 protocol supports only long data formats. The dataloggers are level 2 slave compliant, with some of the operations found in a level 3 implementation.

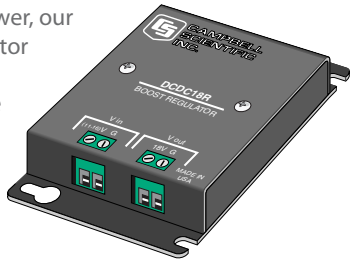
Enclosures
The CR3000 can be housed in an ENC12/14, ENC14/16 and ENC16/18 enclosure. A CR3000 housed in a weather-resistant enclosure can collect data under extremely harsh conditions. The enclosure protects the CR3000 from dust, water, sunlight, or pollutants.

Battery Base Options

Alkaline Base
The alkaline base option includes 10 D-cell batteries with a 10 Ahr rating at 20°C.

Rechargeable Base
The rechargeable base includes an internal 7-Ahr sealed rechargeable battery that can be charged from vehicle power, solar panels, or ac power.

When using vehicle power, our DCDC18R Boost Regulator is used to increase the vehicle's supply voltage to charging levels required by the CR3000.



Low-Profile Base (no battery)
The low-profile (no battery) option requires a user-supplied dc source. It is preferred when the system's power consumption needs a larger capacity battery or when it's advantageous for the Micrologger to be thinner and lighter.

Communication Options

To determine the best option for an application, consider the accessibility of the site, availability of services (e.g., cellular phone or satellite coverage), quantity of data to collect, and desired time between data-collection sessions. Some communication options can be combined—increasing the flexibility, convenience, and reliability of the communications.

CompactFlash®

A CFM100 or NL115 module attached to a CR3000 can store data on a CompactFlash (CF) card. The PC reads the CF card using either the CF1 CompactFlash Adapter or a 17752 USB Reader/Writer. Please note that the CF card should be industrial-grade with a storage capacity of 2 Gbytes or less.

Campbell Scientific offers 64 Mbyte, 256 Mbyte, 1 Gbyte (shown), and 2 Gbyte industrial-grade CompactFlash cards.

Direct Links

A PC or laptop can be connected directly to the datalogger's RS-232 port (no interface required). This port provides electrical isolation. Alternatively, the PC or laptop can be connected to the CR3000's CS I/O port via an SC32B or SC-USB interface.

Keyboard Display

The CR3000's integrated keyboard display is used to program the datalogger, manually initiate data transfer, and display data. It displays 8 lines x 21 characters (64 x 128 pixels) and has a 16-character keyboard. Custom menus are supported allowing customers to set up choices within the datalogger program that can be initiated by a simple "toggle" or "pick list"

CD295 DataView II Display

This two-line, 32-character LCD displays one real-time value, a description, and units. It is typically mounted in an enclosure lid, which allows customers to view the CR3000's data on-site without opening the enclosure.

Ethernet

Use of an NL120, NL115, or NL100 interface enables the CR3000 to communicate over a local network or a dedicated Internet connection via TCP/IP. The NL115 can also store data on a CompactFlash card.

Multidrop Interface

The MD485 intelligent RS-485 interface permits a PC to address and communicate with one or more dataloggers over a single CABLE3CBL cable. Distances up to 4000 feet are supported.

Short Haul Modems

The SRM-5A RAD Short Haul Modem supports communications between the CR3000 and a PC via a four-wire unconditioned line (two twisted pairs).

PDAs

Customers can set the CR3000's clock, monitor real-time data, retrieve data, graph data, and transfer CR3000 programs via a PDA. PDAs with a Palm™ OS require PConnect software (purchased separately); PDAs with a Windows® Pocket PC/Windows Mobile OS require PConnectCE software (purchased separately).

Satellite Transmitters

Our NESDIS-certified GOES satellite transmitter provides one-way communications from a Data Collection Platform (DCP) to a receiving station. We also offer an Argos transmitter that is ideal for high-altitude and polar applications and a METEOSAT transmitter for European applications.

Radios

Radio frequency (RF) communications are supported via narrow-band UHF, narrow-band VHF, spread spectrum, or meteor burst radios. Line-of-sight is required for all of our RF options.

Telephone Networks

The CR3000 can communicate with a PC using landlines, cellular CDMA, or cellular GPRS transceivers. A voice synthesized modem enables anyone to call the CR3000 via phone and receive a verbal report of real-time site conditions.

Meteorological conditions measured at Lake Louise, Alberta, Canada are telemetered via phone-to-RF link to a base station.

Channel Expansion

4-Channel Low Level AC Module

The LLAC4 is a small peripheral device that allows customers to increase the number of available low-level ac inputs by using control ports. This module is often used to measure up to four anemometers, and is especially useful for wind profiling applications.

Synchronous Devices for Measurement (SDMs)

SDMs are addressable peripherals that expand the datalogger's measurement and control capabilities. For example, SDMs are available to add control ports, analog outputs, pulse count channels, interval timers, or even a CANbus interface to the system. Multiple SDMs, in any combination, can be connected to one datalogger.

Multiplexers

Multiplexers increase the number of sensors that can be measured by a datalogger by sequentially connecting each sensor to the datalogger. Several multiplexers can be controlled by a single datalogger.

The CR3000 is compatible with the AM16/32B (shown above) and AM25T multiplexers.

Software

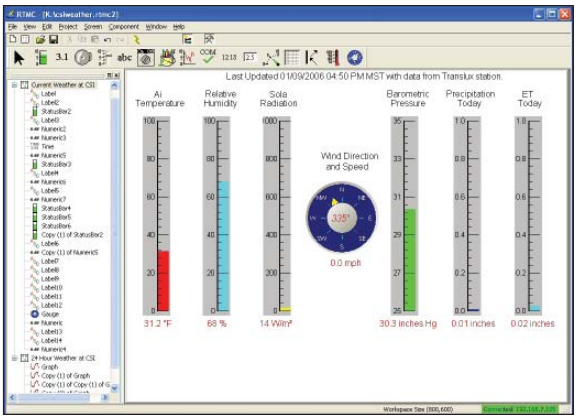
Starter Software

Our easy-to-use starter software is intended for first time users or applications that don't require sophisticated communications or datalogger program editing. SCWin Short Cut generates straight-forward CR3000 programs in four easy steps. PC200W allows customers to transfer a program to, or retrieve data from a CR3000 via a direct communications link.

At www.campbellsci.com/downloads, you can download starter software at no charge. Our Resource CD also provides this software as well as PDF versions of our brochures and manuals.

Datalogger Support Software

Our datalogger support software packages provide more capabilities than our starter software. These software packages contains program editing, communications, and display tools that can support an entire datalogger network.

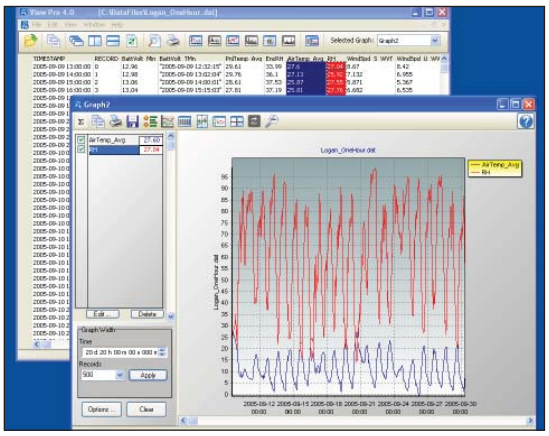


RTMC, a program for displaying the datalogger's data, is bundled with LoggerNet and RTDAQ. Customers may also purchase the RTMCRT and RTMC Web Server clients, which use forms created in the developer mode of RTMC.

PC400, our mid-level software, supports a variety of telemetry options, manual data collection, and data display. For programming, it includes both Short Cut and the CRBasic program editor. PC400 does not support combined communication options (e.g., phone-to-RF) or scheduled data collection.

RTDAQ is an ideal solution for industrial and real-time users desiring to use reliable data collection software over a single telecommunications medium, and who do not rely on scheduled data collection. RTDAQ's strength lies in its ability to handle the display of high speed data.

LoggerNet is Campbell Scientific's full-featured datalogger support software. It is referred to as "full-featured" because it provides a way to accomplish almost all the tasks you'll need to complete when using a datalogger. LoggerNet supports combined communication options (e.g., phone-to-RF) and scheduled data collection.



RTDAQ includes View Pro which will display historical data in a tabular or graphical format.

Applications

Open Path Eddy Covariance Systems
These systems use eddy covariance techniques to calculate water vapor, carbon dioxide, and heat flux.

For eddy covariance applications, the CR3000 can measure the LI7500 Open-Path CO_2 Analyzer, CSAT3 Sonic Anemometer, and KH20 Krypton Hygrometer then compute fluxes.

Below are the sensors used and their measurements:

- CSAT3 Sonic Anemometer—absolute wind and sonic temperature fluctuations
- KH20 Hygrometer—fluctuations of atmospheric water vapor
- LI7500 Infrared Gas Analyzer—both absolute CO_2 and water vapor
- FW05 Fine Wire Thermocouple—absolute temperature

The CR3000 measures the above sensors and computes fluxes on-line. The raw time-series data can be saved to a CompactFlash card, along with processed data for later analysis. A PC at the site is not required. The CR3000's storage capacity can be increased using CompactFlash cards.

Meteorology
The CR3000 is used in long-term climatological monitoring, meteorological research, and routine weather measurement applications.

Sensors the CR3000 can measure include:

- RH sensors
- cup, propeller, and sonic anemometers
- wind vanes
- tipping bucket rain gages
- pyranometers
- ultrasonic ranging sensor
- thermistors, RTDs, and thermocouples
- barometers
- cooled mirror hygrometers

Wind Profiling
Our data acquisition systems can monitor conditions at wind assessment sites, at producing wind farms, and along transmission lines. The CR3000 makes and records measurements, controls electrical devices, and can function as PLCs or RTUs. Because the Micrologger has its own power supply (batteries, solar panels), it can continue to measure and store data and perform control during power outages.

Typical sensors for wind assessment applications include, but are not limited to:

- cup, propeller, and sonic anemometers (up to 10 anemometers can be measured by using two LLAC4 peripherals)
- wind vanes
- thermistors, RTDs, and thermocouples
- barometers
- pyranometers

Photo courtesy RADTech Ltd. UK

A Campbell Scientific datalogging system monitors this offshore wind farm located between Rhyl and Prestatyn in North Wales at about 7 to 8 km out to sea.

Agriculture and Agricultural Research

The versatility of the CR3000 allows measurement of agricultural processes and equipment in applications such as:

- plant water research
- canopy energy balance
- machinery performance
- plant pathology
- crop management decisions
- food processing/storage
- frost prediction
- irrigation scheduling
- integrated pest management

Air Quality

The CR3000 can monitor and control gas analyzers, particle samplers, and visibility sensors. It can also automatically control calibration sequences and compute conditional averages that exclude invalid data (e.g., data recorded during power failures or calibration intervals).

The CR3000 can be used in networks of dataloggers that continuously monitor air quality.

Road Weather/RWIS

Our fully NTCIP-compliant Environmental Sensor Stations (ESS) are robust, reliable weather stations used for road weather/RWIS applications. A typical ESS includes a tower, CR3000, two road sensors, remote communication hardware, and sensors that measure wind speed and direction, air temperature, humidity, barometric pressure, solar radiation, and precipitation.

Soil Water

The CR3000 is compatible with soil water blocks, matric water potential sensors, Time-Domain Reflectometery (TDR) systems, self-contained water content reflectometers, and tensiometers. These soil water instruments are used extensively to monitor water content and matric potential in applications requiring knowledge of soil water inventory or movement.

Vehicle Testing

This versatile, rugged datalogger is ideally suited for testing cold and hot temperature, high altitude, off-highway, and cross-country performance. The CR3000 is compatible with our SDM-CAN interface and GPS16X-HVS receiver.

Vehicle monitoring includes not only passenger cars, but airplanes, locomotives, helicopters, tractors, buses, heavy trucks, drilling rigs, race cars, and motorcycles.

The CR3000 can measure:

- Suspension—strut pressure, spring force, travel, mounting point stress, deflection, ride
- Fuel system—line and tank pressure, flow, temperature, injection timing
- Comfort control—ambient and supply air temperature, solar radiation, fan speed, ac on and off, refrigerant pressures, time-to-comfort, blower current
- Brakes—line pressure, pedal pressure and travel, ABS, line and pad temperature
- Engine—pressure, temperature, crank position, RPM, time-to-start, oil pump cavitation
- General vehicle—chassis monitoring, road noise, vehicle position and speed, steering, air bag, hot/cold soaks, wind tunnels, traction, CANbus, wiper speed and current, vehicle electrical loads

Other Applications

- Stuctural or fatigue analysis
- Wireless sensor/datalogger networks
- Water quality
- Water level/flow
- Mesonet systems
- Avalanche forecasting, snow science, polar, high altitude
- HVAC Systems
- Aerospace/aviation

The CR3000 can monitor and control pumps, fans, and starter motors in an HVAC system.

CR3000 Specifications

ANALOG INPUTS *(SE1-SE28 or DIF1-DIF14)*

14 differential (DF) or 28 single-ended (SE) voltage measurements individually configured. Ratiometric resistive bridge, thermocouple, and period average (frequency) measurements also supported on all analog input channels. Channel expansion provided by AM16/32B and AM25T multiplexers.

RANGES, RESOLUTION: 16-bit basic resolution (Basic Res). **Resolution of DF measurements with input reversal is half the Basic Res (17-bits).**

Input Range (mV)[1]	DF Res (µV)[2]	Basic Res (µV))
±5000	83.33	167
±1000	16.67	33.3
±200	3.33	6.67
±50	0.83	1.67
±20	0.33	0.67

[1]Range overhead of ~9% exists on all ranges to guarantee that the full-scale range values will not cause overrange.

[2]Resolution of DF measurements with input reversal.

ACCURACY[3]:

±(0.04% of reading + offset), 0° to 40°C
±(0.07% of reading + offset), -25° to 50°C
±(0.09% of reading + offset), -40° to 85°C (-XT only)

[3]Accuracy does not include sensor and measurement noise. Offsets are defined as:

Offset for DF w/input reversal = 1.5·Basic Res + 1.0 µV
Offset for DF w/o input reversal = 3·Basic Res + 2.0 µV
Offset for SE = 3·Basic Res + 5.0 µV

MEASUREMENT SPEED: Time includes 250 µs for conversion to engineering units. For voltage measurements, the CR3000 integrates the input signal.

Integration Type	Integration Time	Settling Time	Measurement Total Time Standard	Input Rev.
250	250 µs	200 µs	~0.7 ms	~1.4 ms
60 Hz filter	16.67 ms	3 ms	~20 ms	~40 ms
50 Hz filter	20.00 ms	3 ms	~23 ms	~46 ms

INPUT NOISE VOLTAGE: For DF measurements with input reversal on ±20 mV input range; digital resolution dominates for higher ranges.

250 µs Integration: 0.4 µV RMS
50/60 Hz Integration: 0.19 µV RMS

COMMON MODE RANGE: ±5 V

DC COMMON MODE REJECTION: >100 dB

NORMAL MODE REJECTION: 70 dB @ 60 Hz when using 60 Hz rejection

SUSTAINED INPUT VOLTAGE W/O DAMAGE: ±16 VDC max.

INPUT CURRENT: ±1 nA typical, ±6 nA max. @ 50°C; ±120 nA @ 85°C

INPUT RESISTANCE: 20 Gohms typical

ACCURACY OF BUILT-IN REFERENCE JUNCTION THERMISTOR (for thermocouple measurements):

±0.3°C, -25° to 50°C;
±0.8°C, -40° to 85°C (-XT only)

PERIOD AVERAGE MEASUREMENTS: Any of the 28 SE analog inputs can be used for period averaging. Accuracy is ±(0.01% of reading + resolution) where resolution is 96 ns divided by the specified number of cycles to be measured.

Input Amplitude & Frequency:

Volt. Gain	Range Code	Signal (peak to peak) Min (mV)	Max (V)[4]	Pulse W. Min. (µs)	Max. Freq. (kHz)[5]
1	mV1000	200	10	2.5	200
5	mV200	20	2	5.0	100
20	mV50	5	2	10.0	50
50	mV20	2	2	25.0	20

[4]Maximum signal must be centered at datalogger ground.
[5]Assuming 50% duty cycle.

ANALOG OUTPUTS *(Vx1-Vx4, Ix1-Ix3, CAO1, CAO2)*

4 switched voltage and 3 switched current outputs for ratiometric sensor/bridge excitation and 2 continuous voltage outputs. Switched outputs active only during measurement, one at a time.

	Range	Res	Current Source/Sink	Compliance Voltage
Vx:	±5 V	0.17 mV	±50 mA	N/A
CAO:	±5 V	0.17 mV	±15 mA	N/A
Ix:	±2.5 mA	0.08 µA	N/A	±5 V

Vx & CAO ACCURACY:
±(0.04% of setting + 0.5 mV), 0° to 40°C
±(0.07% of setting + 0.5 mV), -25° to 50°C
±(0.09% of setting + 0.5 mV), -40° to 85°C (-XT only)

Ix ACCURACY:
±(0.1% of setting + 0.5 µA), 0° to 40°C
±(0.13% of setting + 0.5 µA), -25° to 50°C
±(0.15% of setting + 0.5 µA), -40° to 85°C (-XT only)

Vx FREQUENCY SWEEP FUNCTION: The switched outputs provide a programmable swept frequency, 0 to 5 V square wave for exciting vibrating wire transducers.

RESISTANCE MEASUREMENTS

MEASUREMENT TYPES: The CR3000 provides ratiometric measurements of 4- and 6-wire full bridges, and 2-, 3-, and 4-wire half bridges. Precise, dual polarity excitation for voltage or current excitations eliminates DC errors. Offset values are reduced by a factor of 2 when excitation reversal is used.

VOLTAGE RATIO ACCURACY[1]: Assuming excitation voltage of at least 500 mV, and not including bridge resistor errors

±(0.02% of voltage reading + offset)/V_x, 0° to 40°C
±(0.025% of voltage reading + offset)/V_x, -25° to 50°C
±(0.03% of voltage reading + offset)/V_x, -40° to 85°C

[1]Accuracy does not include sensor and measurement noise. Offsets are defined as:

Offset for DF w/input reversal = 1.5·Basic Res + 1.0 µV
Offset for DF w/o input reversal = 3·Basic Res + 2.0 µV
Offset for SE = 3·Basic Res + 5.0 µV

ACCURACY WITH CURRENT EXCITATION[1]: Assuming excitation current of at least 500 µA.

±(0.02% of voltage reading + offset)/I_x, 0° to 40°C
±(0.025% of voltage reading + offset)/I_x, -25° to 50°C
±(0.03% of voltage reading + offset)/I_x, -40° to 85°C

[1]Accuracy does not include sensor and measurement noise. Offsets are defined as:

Offset for DF w/input reversal = 1.5·Basic Res + 1.0 µV
Offset for DF w/o input reversal = 3·Basic Res + 2.0 µV
Offset for SE = 3·Basic Res + 5.0 µV

DEDICATED PULSE COUNTERS *(P1-P4)*

Four inputs individually selectable for switch closure, high frequency pulse, or low-level AC. Independent 24-bit counters (16.8 x 10^6 counts) for each input.

SWITCH CLOSURE MODE:
Minimum Switch Closed Time: 5 ms
Minimum Switch Open Time: 6 ms
Max. Bounce Time: 1 ms open w/o being counted

HIGH FREQUENCY PULSE MODE:
Voltage Thresholds: Count upon transition from below 0.9 V to above 2.2 V after input filter with 1.2 µs time constant.
Maximum Input Voltage: ±20 V
Maximum Input Frequency: 250 kHz

LOW LEVEL AC MODE: Internal AC coupling removes DC offsets up to ±0.5 V.

Input Hysteresis: 16 mV @ 1 Hz
Maximum AC Input Voltage: ±20 V
Minimum ac Input Voltage:

Sine wave (mV RMS)	Range (Hz)
20	1.0 to 20
200	0.5 to 200
2000	0.3 to 10,000
5000	0.3 to 20,000

DIGITAL CONTROL PORTS *(C1-C8, SDM)*

8 digital control ports (C1-C8) having multiple function capability including digital control outputs, digital control interrupts, pulse counting, switch closure, frequency/period measurements, edge timing, SDI-12 communication, and asynchronous communications (UARTs). 3 ports are dedicated for SDM communications.

INPUT STATE: high 3.8 to 16 V; low -8.0 to 1.2 V

INPUT HYSTERESIS: 1.4 V

INPUT RESISTANCE: 100 kohms

HIGH FREQUENCY MAX: 400 kHz

SWITCH CLOSURE FREQUENCY MAX: 150 Hz

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

OUTPUT RESISTANCE: 330 ohms

ADDITIONAL DIGITAL PORTS: SDM-C1, SDM-C2, SDM-C3 are dedicated for measuring SDM devices.

SWITCHED 12 V *(SW12V)*

Two independent 12 V unregulated sources switched on and off under program control. Thermal fuse hold current = 900 mA @ 20°C, 650 mA @ 50°C, 360 mA @ 85°C.

CE COMPLIANCE

STANDARD(S) TO WHICH CONFORMITY IS DECLARED: IEC61326:2002

COMMUNICATION

RS-232 PORTS:
9-pin: DCE (electrically isolated) for computer or non-CSI modem connection
COM1 to COM4: Four independent Tx/Rx pairs on control ports (non-isolated); 0 to 5 V UART
Baud Rate: Selectable from 300 to 115.2 kbps.
Format: 7, 8 data bits; 1, 2 stop bits; odd, even, or no parity

CS I/O PORT: Interface with CSI peripherals.

SDI-12: Digital Control ports 1, 3, 5, and 7 are individually configurable and meet Standard version 1.3 for datalogger mode. Up to ten SDI-12 sensors are supported per port.

SDM PORT: Interface with CSI Synchronous Devices for Measurement

PERIPHERAL PORT: 40-pin interface for attaching CompactFlash or Ethernet peripherals

SYSTEM

PROTOCOLS SUPPORTED: PakBus, Modbus, DNP3

PROGRAM EXECUTION INTERVALS: 10 ms to 30 min. @ 10 ms increments

PROCESSOR: Renesas H8S 2674 (16-bit CPU with 32-bit internal core)

MEMORY: 2 Mbytes of Flash for operating system; 4 Mbytes of battery-backed SRAM for CPU usage, program storage and data storage

CLOCK ACCURACY: ±3 min. per year

SYSTEM POWER REQUIREMENTS

VOLTAGE: 10 to 16 VDC

TYPICAL CURRENT DRAIN: Sleep Mode: 2 mA
1 Hz Sample Rate (one fast SE meas.): 3 mA
100 Hz Sample Rate (one fast SE meas.): 10 mA
100 Hz Sample Rate (one fast SE meas. w/RS-232 communications): 38 mA
Display on: add 1 mA to current drain
Backlight on: add 42 mA to current drain

INTERNAL BATTERIES: 10 Ahr alkaline or 7 Ahr rechargeable base. 1200 mAhr lithium battery for clock and SRAM backup typically provides 3 years of back-up.

EXTERNAL BATTERIES: 12 VDC nominal; reverse polarity protected.

PHYSICAL SPECIFICATIONS

SIZE: 9.5" x 7.0" x 3.8" (24.1 x 17.8 x 9.6 cm). Terminal strips extend 0.875" (2.2 cm) and terminal strip cover extends 1.575" (4.0 cm) above the panel.

WEIGHT: 3.6 lbs (1.6 kg) with low profile base; 8.3 lbs (3.8 kg) with alkaline base; 10.7 lbs (4.8 kg) with rechargeable base.

WARRANTY

3 years against defects in materials and workmanship.

Electrical specifications are valid over a -25° to +50°C range unless otherwise specified; non-condensing environment required. To maintain electrical specifications, Campbell Scientific recommends recalibrating dataloggers every two years. We recommend that you confirm system configuration and critical specifications with Campbell Scientific before purchase.

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