

# CR100Xe Specifications



Data Logger

Electrical specifications are valid over a -40 to +70 °C, non-condensing environment, unless otherwise specified. Extended electrical specifications (noted as XT in specifications) are valid over a -55 to +85 °C non-condensing environment. Recalibration is recommended every three years. Critical specifications and system configuration should be confirmed with Campbell Scientific before purchase.

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## System specifications

**Processor:** Renesas RX63N (32-bit with hardware FPU, running at 100 MHz)

### Memory:

- Total onboard: 128 MB of flash + 4 MB battery-backed SRAM
  - Data storage: 4 MB SRAM + 72 MB flash (extended data storage automatically used for auto-allocated Data Tables not being written to a card)
  - CPU drive: 30 MB flash
  - OS load: 8 MB flash
  - Settings: 1 MB flash
  - Reserved (not accessible): 10 MB flash
- Data storage expansion: Removable microSD flash memory, up to 16 GB

**Program Execution Period:** 1 ms to 1 day

### Real-Time Clock:

- Battery backed while external power is disconnected
- **Resolution:** 1 ms
- **Accuracy:** ±3 min. per year, optional GPS correction to ±10 µs

**Wiring Panel Temperature:** Measured using a 10K3A1A BetaTHERM thermistor, located between the two rows of analog input terminals.

## Physical specifications

**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/Mass:** 0.86 kg (1.9 lb)

**Case Material:** Powder-coated aluminum

## Power requirements

**Protection:** Power inputs are protected against surge, over-voltage, over-current, and reverse power. IEC 61000-4 Class 4 level.

### Power In Terminal:

- **Supply Voltage:** 10 to 36 VDC
- **Sustained Supply Voltage without Damage:** 38 VDC

**Vehicle Power Connection:** When primary power is pulled from the vehicle power system, a second power supply OR charge regulator may be required to overcome the voltage drop at vehicle start-up.

**USB Power:** Functions that will be active with USB 5 VDC applied include sending programs, adjusting data logger settings, and making some measurements. If USB is the only power source, then the CS I/O port and the 5V, 12V, and SW12 terminals will not be operational.

**Internal Lithium Battery:** AA, 2.4 Ah, 3.6 VDC (Tadiran TL 5903/S) for battery-backed SRAM and clock. 3-year life with no external power source.

Average Current Consumption (typ. at 20 °C):

| Operating state              | 12 V Supply voltage | 24 V Supply voltage |
|------------------------------|---------------------|---------------------|
| Idle                         | 2.0 mA              | <1.0 mA             |
| Active 1 Hz Scan             | 2.0 mA              | 1.1 mA              |
| Active 20 Hz Scan            | 57 mA               | 36 mA               |
| Serial (RS-232/RS-485)       | Active + 25 mA      | Active + 16 mA      |
| Ethernet Power Requirements: |                     |                     |
| Ethernet 1 Minute            | Active + 1 mA       | Active + 0.7 mA     |
| Ethernet Idle                | Active + 4 mA       | Active + 2.6 mA     |
| Ethernet Link                | Active + 47 mA      | Active + 31 mA      |

power output specifications

System power output current limits

| Temperature (°C)  | 12 V Supply voltage<br>Current limit <sup>1</sup> (A) | 24 V Supply voltage<br>Current limit <sup>1</sup> (A) |
|---|---|---|
| –55°  | 3.4   | 4.4   |
| –40°  | 3.4   | 4.4   |
| 20°   | 3.4   | 4.4   |
| 70°   | 2.5   | 4.2   |
| 85°   | 2.1   | 4.0   |
| <sup>1</sup> Limited by self-resetting thermal fuse and maximum regulator output current. |   |   |

Shared 12 V and SW12 power output

12V, SW12-1, and SW12-2 provide regulated 12 VDC power. These outputs are disabled when operating on only USB power.

| Temperature (°C)   | 12 V Supply voltage<br>Current limit <sup>1</sup> (A) | 24 V Supply voltage<br>Current limit <sup>1</sup> (A) |
|--|---|---|
| –55°   | 3.3   | 3.3   |
| –40°   | 3.3   | 3.3   |
| 20°  | 3.3   | 3.3   |
| 70°  | 2.5   | 3.3   |
| 85°  | 2.1   | 3.3   |
| <sup>1</sup> Limited by self-resetting electronic and thermal fuses. |   |   |

Individual maximum current for 12 V and SW12 output terminals

**Regulated 12 V output.** System power output current limits may override one or more of these individual limits. These outputs are disabled when operating on only USB power.

- **Voltage Output:** Regulated 12 V output (±5%)
- **Current Limit:** 2000 mA

5 V fixed output

**Regulated 5 V output.** Supply is shared between the 5V terminal and CS I/O DB9 5 V output.

- **Voltage Output:** Regulated 5 V output (±5%)
- **Current Limit:** 230 mA

Control port as power output

- C Terminals:
  - **Output Resistance ( $R_o$ ):** 150  $\Omega$
  - **5 V Logic Level Drive Capacity:** 10 mA @ 3.5 VDC
  - **3.3 V Logic Level Drive Capacity:** 10 mA @ 1.8 VDC

CS I/O pin 1: 5 V fixed output

**Regulated 5 V output.** Supply is shared between the 5V terminal and CS I/O DB9 5 V output.

- **Voltage Output:** Regulated 5 V output (±5%)
- **Current Limit:** 230 mA

CS I/O pin 8: 12 V switched output

**Regulated 12 V output.** Power output shared with system power output. This output is disabled when operating on only USB power.

- **Voltage Output:** Regulated 12 V output (±5%)
- **Current Limit:** 800 mA

Voltage excitation

**VX:** Four independently configurable voltage terminals (VX1-VX4). When providing voltage excitation, a single 16-bit DAC shared by all VX outputs produces a user-specified voltage during measurement only. VX terminals can also be used to supply a selectable, switched, regulated 3.3 or 5 VDC power source to power digital sensors and toggle control lines.

|   | Range       | Resolution | Accuracy                  | Maximum source/sink current <sup>1</sup> |
|---|-------------|------------|---------------------------|--|
| Voltage Excitation  | ±4 V        | 0.12 mV    | ±(0.1% of setting + 2 mV) | ±40 mA                                   |
| Switched, Regulated   | +3.3 or 5 V | 3.3 or 5 V | ±5%                       | 50 mA                                    |
| <sup>1</sup> Exceeding current limits causes voltage output to become unstable. Voltage should stabilize when current is reduced to within stated limits. |             |            |                           |  |

## Analog measurement specifications

16 single-ended (SE) or 8 differential (DIFF) terminals individually configurable for voltage, thermocouple, current loop, ratiometric, and period average measurements, using a 24-bit ADC. One channel at a time is measured.

### Voltage measurements

Terminals:

- **Differential Configuration:** DIFF 1H/1L – 8H/8L
- **Single-Ended Configuration:** SE1 – SE16

**Input Resistance:** 20 GΩ typical

**Input Voltage Limits:** ±5 V

**Sustained Input Voltage without Damage:** ±20 VDC

**DC Common Mode Rejection:**

- >120 dB with input reversal
- ≥ 86 dB without input reversal

**Normal Mode Rejection:** > 70 dB @ 60 Hz

**Input Current @ 25 °C:** ±1 nA typical

**Filter First Notch Frequency ( $f_{N1}$ ) Range:** 0.5 Hz to 31.25 kHz (user specified)

**Analog Range and Resolution:**

|                                   |                         | Differential with input reversal |                   | Single-ended and differential without input reversal |                   |
|-----------------------------------|-------------------------|----------------------------------|-------------------|--|-------------------|
| Notch frequency ( $f_{N1}$ ) (Hz) | Range <sup>1</sup> (mV) | RMS (μV)                         | Bits <sup>2</sup> | RMS (μV)   | Bits <sup>2</sup> |
| 15000                             | ±5000                   | 8.2                              | 20                | 11.8   | 19                |
|                                   | ±1000                   | 1.9                              | 20                | 2.6  | 19                |
|                                   | ±200                    | 0.75                             | 19                | 1.0  | 18                |
| 50/60 <sup>3</sup>                | ±5000                   | 0.6                              | 24                | 0.88   | 23                |
|                                   | ±1000                   | 0.14                             | 23                | 0.2  | 23                |
|                                   | ±200                    | 0.05                             | 22                | 0.08   | 22                |
| 5                                 | ±5000                   | 0.18                             | 25                | 0.28   | 25                |
|                                   | ±1000                   | 0.04                             | 25                | 0.07   | 24                |
|                                   | ±200                    | 0.02                             | 24                | 0.03   | 23                |

<sup>1</sup> Range overhead of ~5% on all ranges guarantees that full-scale values will not cause over range

<sup>2</sup> Typical effective resolution (ER) in bits; computed from ratio of full-scale range to RMS resolution.

<sup>3</sup> 50/60 corresponds to rejection of 50 and 60 Hz ac power mains noise.

**Accuracy** (does not include sensor or measurement noise):

- 0 to 40 °C: ±(0.04% of measurement + offset)
- –40 to 70 °C: ±(0.06% of measurement + offset)

**Voltage Measurement Accuracy Offsets:**

| Range (mV) | Typical offset (μV RMS)          |   |
|------------|----------------------------------|---|
|            | Differential with input reversal | Single-ended or differential without input reversal |
| ±5000      | ±0.5                             | ±2  |
| ±1000      | ±0.25                            | ±1  |
| ±200       | ±0.15                            | ±0.5  |

**Measurement Settling Time:** 20 μs to 600 ms; 500 μs default

**Multiplexed Measurement Time:**

Measurement Time =

$$\text{Setup Time} + ((\text{Settling Time} + 1/f_{N1}) \times M \times \text{Repetitions})$$

Where:

M = 1 (default)

M = 2 if reverse differential or measurement offset is used

Setup Time = 150 μs

|                                    | Differential with input reversal | Single-ended or differential without input reversal |
|------------------------------------|----------------------------------|---|
| Example $f_{N1}$ <sup>1</sup> (Hz) | Time <sup>2</sup> (ms)           | Time <sup>2</sup> (ms)                              |
| 15000                              | 1.28                             | 0.717   |
| 60                                 | 34.48                            | 17.31   |
| 50                                 | 41.15                            | 20.65   |
| 5                                  | 401.15                           | 200.65  |

<sup>1</sup> Notch frequency (1/integration time).

<sup>2</sup> Default settling time of 500 μs used.

### Resistance measurement specifications

The data logger makes ratiometric-resistance measurements for four- and six-wire full-bridge circuits and two-, three-, and four-wire half-bridge circuits using voltage excitation. Excitation polarity reversal is available to minimize dc error.

**Accuracy:**

Assumes input reversal for differential measurements

**RevDiff** and excitation reversal **RevEx** for excitation voltage <1000 mV. Does not include bridge resistor errors or sensor and measurement noise.

- 0 to 40 °C: ±(0.01% of voltage measurement + offset)
- –40 to 70 °C: ±(0.015% of voltage measurement + offset)
- –55 to 85 °C (XT): ±(0.02% of voltage measurement + offset)

## Period-averaging measurement specifications

**Terminals:** SE1-SE16

**Accuracy:**  $\pm(0.01\%$  of measurement + resolution), where resolution is 0.13  $\mu\text{s}$  divided by the number of cycles to be measured

**Ranges:**

- Minimum signal centered around specified period average threshold.
- Maximum signal centered around data logger ground.
- Maximum frequency =  $1/(2 * [\text{minimum pulse width}])$  for 50% duty cycle signals

| Gain code option | Voltage gain | Minimum peak to peak signal (mV) | Maximum peak to peak signal (V) | Minimum pulse width ( $\mu\text{s}$ ) | Maximum frequency (kHz) |
|------------------|--------------|----------------------------------|---------------------------------|---------------------------------------|-------------------------|
| 0                | 1            | 500                              | 10                              | 2.5                                   | 200                     |
| 1                | 2.5          | 50                               | 2                               | 10                                    | 50                      |
| 2                | 12.5         | 10                               | 2                               | 62                                    | 8                       |
| 3                | 64           | 2                                | 2                               | 100                                   | 5                       |

## Current-loop measurement specifications

The data logger makes current-loop measurements by measuring across a current-sense resistor associated with the RS-485 resistive ground terminal.

**Terminals:** RG1 and RG2

**Sustained Input Voltage without Damage:**  $\pm 13.1\text{ V}$

**Resistance to Ground:** 101  $\Omega$

**Current Measurement Shunt Resistance:** 10  $\Omega$

**Maximum Current Measurement Range:**  $\pm 80\text{ mA}$

**Sustained Maximum Current without Damage:**  $\pm 130\text{ mA}$

**Resolution:**

- $\pm 1000\text{ mV range}$ :  $\leq 20\text{ nA}$
- $\pm 200\text{ mV range}$ :  $\leq 7.5\text{ nA}$

**Accuracy:**  $\pm(0.1\%$  of reading + 100 nA) @ -40 to 70  $^{\circ}\text{C}$

## Pulse measurement specifications

Terminals individually configurable for switch closure, high-frequency pulse, or low-level AC measurements. Each terminal has its own independent 24-bit counter.

### NOTE:

Conflicts can occur when a control port pair is used for different instructions ([TimerInput\(\)](#), [PulseCount\(\)](#), [SDI12Recorder\(\)](#), [WaitDigTrig\(\)](#)). For example, if C1 is used for [SDI12Recorder\(\)](#), C2 cannot be used for [TimerInput\(\)](#), [PulseCount\(\)](#), or [WaitDigTrig\(\)](#).

**Sustained Input Voltage without Damage:** (P1-P2):  $\pm 20\text{ VDC}$

**Sustained Logic Input Voltage without Damage:** (C1-C8): +16/-12 VDC

**Maximum Counts Per Scan:**  $2^{24}$

**Input Resistance:** 5 k $\Omega$

**Accuracy:**  $\pm(0.02\%$  of reading + 1/scan)

## Low-level AC input

**Terminals:** P1-P2

**Minimum Pull-Down Resistance:** 10 k $\Omega$  to ground

**DC-offset rejection:** Internal AC coupling eliminates DC-offset voltages up to  $\pm 0.05\text{ VDC}$

**Input Hysteresis:** 12 mV at 1 Hz

**Low-Level AC Pulse Input Ranges:**

| 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 |

## Switch closure input

**Terminals:** C1-C8, P1-P2

**Pull-Up Resistance:** 100 k $\Omega$  to 5 V

**Event:** Low ( $< 0.8\text{ V}$ ) to High ( $> 2.5\text{ V}$ )

**Maximum Input Frequency:** 100 Hz

**Minimum Switch Closed Time:** 5 ms

**Minimum Switch Open Time:** 5 ms

**Maximum Bounce Time:** 1 ms open without being counted

## High-frequency input

**Terminals:** C1-C8, P1-P2

**Pull-Up Resistance:** 100 k $\Omega$  to 5 V

**Event:** Low ( $< 0.8\text{ V}$ ) to High ( $> 2.5\text{ V}$ )

**Maximum Input Frequency:** 250 kHz

## Digital input/output specifications

Terminals configurable for digital input and output (I/O) including status high/low, pulse width modulation, external interrupt, edge timing, switch closure pulse counting, high-frequency pulse counting, plus UART<sup>1</sup>, RS-232<sup>2</sup>, RS-422<sup>3</sup>,

<sup>1</sup>Universal Asynchronous Receiver/Transmitter for asynchronous serial communications.

<sup>2</sup>Recommended Standard 232. A loose standard defining how two computing devices can communicate with each other. The implementation of RS-232 in Campbell Scientific data loggers to computer communications is quite rigid, but transparent to most users. Features in the data logger that implement RS-232 communications with smart sensors are flexible.

<sup>3</sup>Communications protocol similar to RS-485. Most RS-422 sensors will work with RS-485 protocol.

RS-485<sup>1</sup>, SDM<sup>2</sup>, SDI-12<sup>3</sup>, I2C<sup>4</sup>, and SPI<sup>5</sup> serial-communications functions. Terminals are configurable in pairs for 5 V or 3.3 V logic for some functions.

**NOTE:**  
Conflicts can occur when a control port pair is used for different instructions (`TimerInput()`, `PulseCount()`, `SDI12Recorder()`, `WaitDigTrig()`). For example, if C1 is used for `SDI12Recorder()`, C2 cannot be used for `TimerInput()`, `PulseCount()`, or `WaitDigTrig()`.

**Terminals:** C1-C8  
**Sustained Logic Input Voltage without Damage:** +16/-12 VDC  
**Logic Levels and Drive Current:**

| Terminal pair configuration | 5 V source   | 3.3 V source  |
|-----------------------------|--------------|---------------|
| Logic low                   | ≤ 1.5 V      | ≤ 0.8 V       |
| Logic high                  | ≥ 3.5 V      | ≥ 2.5 V       |
| C1 - C8                     | 10 mA @ 3.5V | 10 mA @ 1.85V |

Edge timing

**Terminals:** C1-C8  
**Maximum Input Frequency:** ≤ 1 kHz  
**Resolution:** 500 ns

Edge counting

**Terminals:** C1-C8  
**Maximum Input Frequency:** ≤ 2.3 kHz

Quadrature input

**Terminals:** C1-C8 can be configured as digital pairs to monitor the two sensing channels of an encoder.  
**Maximum Frequency:** 2.5 kHz  
**Minimum Pulse Width:** 10 μs

Pulse-width modulation

**Terminals:** C1-C8  
**Maximum Period:** 128 seconds  
**Resolution:**

- 0 – 5 ms: 83.33 ns
- 5 – 300 ms: 5.33 μs
- > 300 ms: 1.95 ms

<sup>1</sup>Recommended Standard 485. A standard defining how two computing devices can communicate with each other.  
<sup>2</sup>Synchronous Device for Measurement. A processor-based peripheral device or sensor that communicates with the data logger via hardware over a short distance using a protocol proprietary to Campbell Scientific.  
<sup>3</sup>Serial Data Interface at 1200 baud. Communications protocol for transferring data between the data logger and SDI-12 compatible smart sensors.  
<sup>4</sup>Inter-Integrated Circuit is a multi-controller, multi-peripheral, packet switched, single-ended, serial computer bus.  
<sup>5</sup>Serial Peripheral Interface - a clocked synchronous interface, used for short distance communications, generally between embedded devices.

Communications specifications

**Ethernet Port:** RJ45 jack, 10/100Base Mbps, full and half duplex, Auto-MDIX, magnetic isolation, and TVS surge protection.  
**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  
**Additional Protocols:** CPI, PakBus, PakBus Encryption, SDM, SDI-12, Modbus RTU / ASCII / TCP, DNP3, custom user definable over serial, NTCIP, NMEA 0183, I2C, SPI  
**USB:** Type C 2.0. Full speed: 12 Mbps. Operates as:

- Device for computer communications

**CS I/O:** 9-pin D-sub connector to interface with Campbell Scientific CS I/O peripherals.  
**SDI-12** (C1, C3, C5, C7): Four independent SDI-12 compliant terminals are individually configured and meet SDI-12 Standard v 1.4.

**RS-485** (C1 to C8): Up to two full duplex or four half duplex  
**RS-422** (C1 to C8): Up to two full duplex or four half duplex  
**RS-232/CPI:** Single RJ45 module port that can operate in one of two modes: CPI or RS-232. CPI interfaces with Campbell Scientific CDM measurement peripherals and sensors. RS-232 connects, with an adapter cable, to computer, sensor, or communications devices serially.  
**CPI:** One CPI bus. Up to 1 Mbps data rate. Synchronization of devices to 5 μs. Total cable length up to 610 m (2000 ft). Up to 20 devices. CPI is a proprietary interface for communications between Campbell Scientific data loggers and Campbell Scientific CDM peripheral devices. It consists of a physical layer definition and a data protocol.

**Hardwired:** Multi-drop, short haul, RS-232, fiber optic  
**Satellite:** GOES, Argos, Inmarsat Hughes, Iridium

Standards compliance specifications

View compliance and conformity documents at [www.campbellsci.com/cr1000x](http://www.campbellsci.com/cr1000x).

| Test  | Applied standard                     | Description |
|---|--------------------------------------|-------------|
| Shock and vibration:                              | MIL-STD 810G methods 516.6 and 514.6 |             |
| Protection:                                       |                                      |             |
| Wiring panel                                      | IP40                                 |             |
| Measurement module when connected to wiring panel | IP65                                 |             |

| Test  | Applied standard | Description                         |
|---|------------------|-------------------------------------|
| EMI and ESD immunity:   |                  |                                     |
| ESD   | IEC 61000-4-2    | ±15 kV air, ±8 kV contact discharge |
| Radiated RF   | IEC 61000-4-3    | 10 V/m, 80-1000 MHz                 |
| EFT   | IEC 61000-4-4    | 4 kV power, 4 kV I/O                |
| Surge   | IEC 61000-4-5    | 4 kV power, 4kV I/O                 |
| Conducted RF  | IEC 61000-4-6    | 10 V power, 10 V I/O                |
| Emissions and immunity performance criteria available on request. |                  |                                     |

## Warranty

**Standard:** Three years against defects in materials and workmanship.

**Extended** (optional): An additional four years, bringing the total to seven years.

## Terminal functions

### Analog input terminal functions

| SE<br>DIFF           | 1 2<br>┌ <sup>1</sup><br>H L | 3 4<br>┌ <sup>2</sup><br>H L | 5 6<br>┌ <sup>3</sup><br>H L | 7 8<br>┌ <sup>4</sup><br>H L | 9 10<br>┌ <sup>5</sup><br>H L | 11 12<br>┌ <sup>6</sup><br>H L | 13 14<br>┌ <sup>7</sup><br>H L | 15 16<br>┌ <sup>8</sup><br>H L | RG1 | RG2 |
|----------------------|------------------------------|------------------------------|------------------------------|------------------------------|-------------------------------|--------------------------------|--------------------------------|--------------------------------|-----|-----|
| Single-Ended Voltage | ✓                            | ✓                            | ✓                            | ✓                            | ✓                             | ✓                              | ✓                              | ✓                              |     |     |
| Differential Voltage | H                            | L                            | H                            | L                            | H                             | L                              | H                              | L                              |     |     |
| Ratiometric/Bridge   | ✓                            | ✓                            | ✓                            | ✓                            | ✓                             | ✓                              | ✓                              | ✓                              |     |     |
| Thermocouple         | ✓                            | ✓                            | ✓                            | ✓                            | ✓                             | ✓                              | ✓                              | ✓                              |     |     |
| Current Loop         |                              |                              |                              |                              |                               |                                |                                |                                | ✓   | ✓   |
| Period Average       | ✓                            | ✓                            | ✓                            | ✓                            | ✓                             | ✓                              | ✓                              | ✓                              |     |     |

### Pulse counting terminal functions

|                | P1 | P2 | C1-C8 |
|----------------|----|----|-------|
| Switch-Closure | ✓  | ✓  | ✓     |
| High Frequency | ✓  | ✓  | ✓     |
| Low-level AC   | ✓  | ✓  |       |

### Analog output terminal functions

|                             | VX1-VX4 |
|-----------------------------|---------|
| Switched Voltage Excitation | ✓       |

### Voltage Output

|         | C1-C8 <sup>1</sup> | VX1-VX4 | 5V | 12V | SW12-1 | SW12-2 | SW12-CSIO |
|---------|--------------------|---------|----|-----|--------|--------|-----------|
| 5 VDC   | ✓                  | ✓       | ✓  |     |        |        |           |
| 3.3 VDC | ✓                  | ✓       |    |     |        |        |           |
| 12 VDC  |                    |         |    | ✓   | ✓      | ✓      | ✓         |

<sup>1</sup>C terminal voltage levels are configured in pairs. The default voltage output from C terminals is 5 V. Use the [PortPairConfig](#) instruction in CRBasic to configure a C terminal pair to output 3.3 V.

### Communications terminal functions

|                             | C1  | C2 | C3 | C4 | C5 | C6 | C7 | C8 | RS-232/CPI |
|-----------------------------|-----|----|----|----|----|----|----|----|------------|
| SDI-12                      | ✓   |    | ✓  |    | ✓  |    | ✓  |    |            |
| GPS                         | PPS | Rx | Tx | Rx | Tx | Rx | Tx | Rx |            |
| TTL 0-5 V <sup>1</sup>      | Tx  | Rx | Tx | Rx | Tx | Rx | Tx | Rx |            |
| LVTTTL 0-3.3 V <sup>1</sup> | Tx  | Rx | Tx | Rx | Tx | Rx | Tx | Rx |            |
| RS-232                      | Tx  | Rx | Tx | Rx | Tx | Rx | Tx | Rx | ✓          |

| Communications terminal functions  |      |      |       |     |      |      |       |     |            |
|--|------|------|-------|-----|------|------|-------|-----|------------|
|  | C1   | C2   | C3    | C4  | C5   | C6   | C7    | C8  | RS-232/CPI |
| RS-485 (Half Duplex)   | A-   | B+   | A-    | B+  | A-   | B+   | A-    | B+  |            |
| RS-485 <sup>2</sup> (Full Duplex)  | Tx-  | Tx+  | Rx-   | Rx+ | Tx-  | Tx+  | Rx-   | Rx+ |            |
| I2C  | SCL  | SDA  | SCL   | SDA | SCL  | SDA  | SCL   | SDA |            |
| SPI  | SCLK | COPI | CIPO  |     | SCLK | COPI | CIPO  |     |            |
| SDM <sup>3</sup>   | Data | Clk  | Enabl |     | Data | Clk  | Enabl |     |            |
| CPI/CDM  |      |      |       |     |      |      |       |     | ✓          |
| <sup>1</sup> TTL and LVTTTL are configured with the CommsMode option of the <a href="#">SerialOpen</a> instruction in CRBasic.<br><sup>2</sup> RS-422 compatible.<br><sup>3</sup> SDM can be on either C1-C3 or C5-C7, but not both at the same time.<br>Communications functions also include Ethernet and USB. |      |      |       |     |      |      |       |     |            |

| Digital I/O terminal functions |       |
|--------------------------------|-------|
|                                | C1-C8 |
| General I/O                    | ✓     |
| Pulse-Width Modulation Output  | ✓     |
| Timer Input                    | ✓     |
| Interrupt                      | ✓     |
| Quadrature                     | ✓     |



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