Campbell SCIENTIFIC Quick Deploy Guide

CS211

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www.campbellsci.com/cs211

1. Introduction

The CS211 Smart Enclosure Sensor enables both remote and onsite monitoring of internal enclosure conditions, such as temperature, humidity, and door status (open or closed). It also features a button that detects single and double presses to execute user-defined functions, and an LED to indicate if the enclosure desiccant needs to be replaced.

This manual provides information specific to using a CS211 with CRBasic data loggers.

2. *Short Cut*

Short Cut is an easy way to program your data logger to measure the sensor and assign data logger wiring terminals. ***Short Cut*** is available as a download on www.campbellsci.com/shortcut.

It is also included in installations of ***LoggerNet***, ***RTDAQ***, and ***PC400***. For more information on using ***Short Cut***, see the full CS211 user manual www.campbellsci.com/cs211.

3. Wiring

The CS211 comes with three 61 cm (24 in) long cables to connect from the screw terminals of the CS211 to the data logger. Contact Campbell Scientific if a longer set of cables is required.

Table 3-1 provides connections to Campbell Scientific data loggers. Connect the wires in the order shown in the table.

Table 3-1: SDI-12 wire color, function, and data logger connection

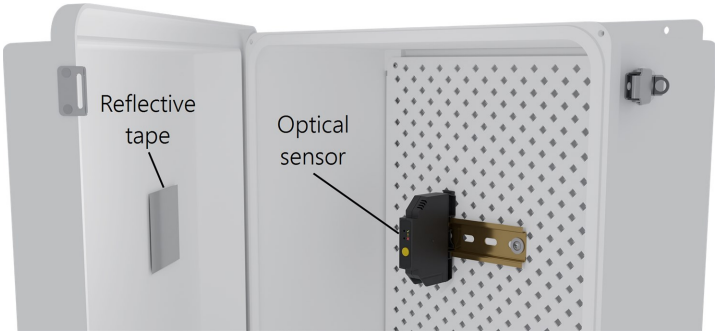
Wire color	Wire function	Data logger connection
Black	Power ground	**G**
White	SDI-12 signal	**C**, **SDI-12**, or CR6 **U** terminal configured for SDI-12[1]
Brown	Power	**12V**

[1]**U** and **C** terminals are automatically configured by the measurement instruction

NOTE:
Campbell Scientific recommends connecting the CS211 to a constant (non-switched) **12V** terminal. Switching power to the CS211 will reset some accumulative values stored in volatile memory.

4. Reflective tape

The CS211 uses an optical sensor and the LED to detect if the enclosure is open or closed. To enable this feature, install the reflective tape inside the enclosure door, such that it is directly in front of the sensor when the door is closed.



5. Specifications

Supply voltage:	7 to 28 VDC
Current consumption	
Average:	< 100 µA
Peak:	< 30 mA (approx. 5 ms every 5 s)
Operating temperature:	–40 to 60 °C
Measurement uncertainty	
Relative humidity:	±3% RH (10 to 90% RH) (at 25 °C)
Temperature:	±0.4 °C (–40 to 60 °C)
RH measurement range:	0 to 100% (non-condensing)
Dimensions:	80 x 59 x 15 mm (3.15 x 2.32 x 0.59 in)
Start Up Time:	3 s

6. SDI-12 sensor measurements

Table 6-1: SDI-12 command list

Commands[1]	Values returned or function performed
*a*R0!, or *a*M!, or *a*C!	1. Temperature (°C) 2. Humidity (RH) 3. Door state (indication) 4. Enclosure state (indication)
*a*R1!, or *a*M1!, or *a*C1!	1. Temperature (°F) 2. Humidity (% RH) 3. Door state (indication) 4. Enclosure state (indication)
*a*R2!, or *a*M2!, or *a*C2!	1. Single presses (count) 2. Double presses (count) 3. Long presses (count)
*a*R3!, or *a*M3!, or *a*C3!	1. Door opens (count) 2. Wetness (ratio)

[1] *a* is the SDI-12 address. In the `SDI12Recorder()` CRBasic instruction, the command parameter does not include the SDI-12 address because the address is a separate parameter.

7. Optical door switch

The CS211 uses an optical sensor and LED to detect door opens and closes. A combination of ambient light and reflected light measurements are used to determine the state of the door.

Table 7-1: Door switch states

Door state	Value	Description
Unknown	–1	Default on power up or when door reflectivity is poor. Unable to reliably detect the current door state.
Closed	0	High reflectivity, the door is closed.
Open	1	Increased ambient light or low reflectivity means the door is open.

NOTE:
The number of **Door Opens** returned from the M3! command returns the number of times the door has been opened since the last **M3!** command and will reset each time a M3!, R3!, or C3! command is sent.

8. Enclosure state and wetness ratio

Alongside direct temperature and humidity measurements, the CS211 also calculates a Wetness Ratio and Enclosure State to provide insights into the internal conditions of the enclosure over the past 24 hours (or since the device was last powered).

The **Enclosure State** can be read via SDI-12 and is also indicated by an LED color, providing on-site staff with a quick visual reference of the condensation risk based on the Wetness Ratio over the past 24 hours. The LED flashes green, amber, or red to represent low, moderate, and high risk of condensation, respectively.

Table 8-1: Enclosure states

LED color	Enclosure state (SDI-12 value)	Description
Green (✔)	OK (0)	Desiccant working well Low risk of condensation (≤ 10% of last 24 hrs above 80% RH)
Amber (!)	Caution (1)	Desiccant close to exhaustion Moderate risk of condensation (≤ 30% of last 24 hrs above 80% RH)
Red (✖)	Alarm (2)	Desiccant exhausted High risk of condensation (> 30% of last 24 hrs above 80% RH)

9. Button presses

A single, double, or long press (> 1 second) of the CS211 button can trigger events or change the data logger state. The indicator LED will flash purple in response to button presses: one short flash for a short press, two short flashes for double press, and a single longer flash for a long press.

A long button press is used to reset the Enclosure State and Status LED, which should be done when replacing the enclosure desiccant. The date that the desiccant was replaced can be recorded in the data logger table.

NOTE:
The M2! command returns the number of single, double, and long button presses since the last time the command was issued.