

## Interfacing the eosFD to a Campbell Scientific CR1000 logger

### Introduction

The Campbell Scientific CR1000 is a popular data logger which provides a plethora of options for connecting and recording multiple sensors. The Eosense eosFD CO<sub>2</sub> flux chamber has internal data storage as well as voltage output options. This note is provided to help you decide which connection method is right for your application and demonstrate the connection process.

### Required Components

- eosFD
- Campbell Scientific CR1000 data logger
- Short Cut software (CR1000)
- Power & Data Cable (SSC/SLC)
- Power Connector
- Ground Connector

### Differential Mode

The eosFD's analog outputs can be connected to the CR1000's differential inputs. Plug the included 3-pin ground connector Power and Data Cable. This supplies a separate ground reference for each analog output. The analog/ground pairs can then be connected to high/low (H/L) differential input pairs on the CR1000 as shown in Figure 1. The power can be connected to the 12 V output of the CR1000 or can use a separate 12 V power source.

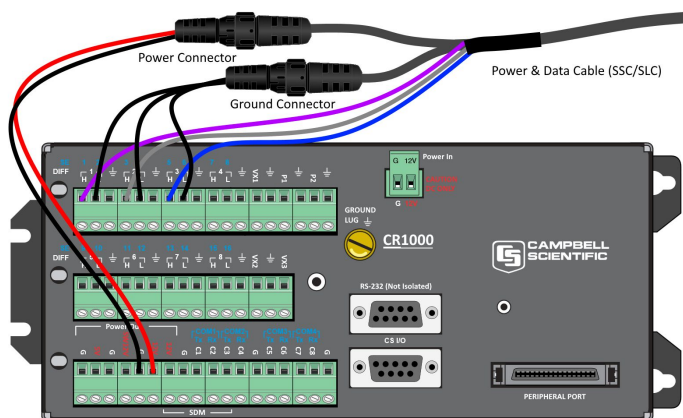


Figure 1: Connecting the eosFD to a CR1000 in differential mode ([printable image](#))

This setup can be configured using Campbell's Short Cut program as there is no complicated programming involved. In the sensor section, select "Differential Voltage" and add 3 sensors. Adjust the properties for each sensor as per Table 1. The eosFD will by default report CO<sub>2</sub> flux, CO<sub>2</sub> sensor temperature and concentration in the eosFD soil cavity.

Table 1: Sensor Properties

Sensor Property	Purple Wire	Grey Wire	Blue Wire
Measurement Result (name)	CO2_Flux	Sens_Temp	Soil_Conc
Measurement Result (units)	μmol/m <sup>2</sup> /s	Degrees C	ppm
Range of Sensor Voltage	0 to 5000 mV	0 to 5000 mV	0 to 5000 mV
Multiplier	0.004	0.014	1.0
Offset	-10	-20	0

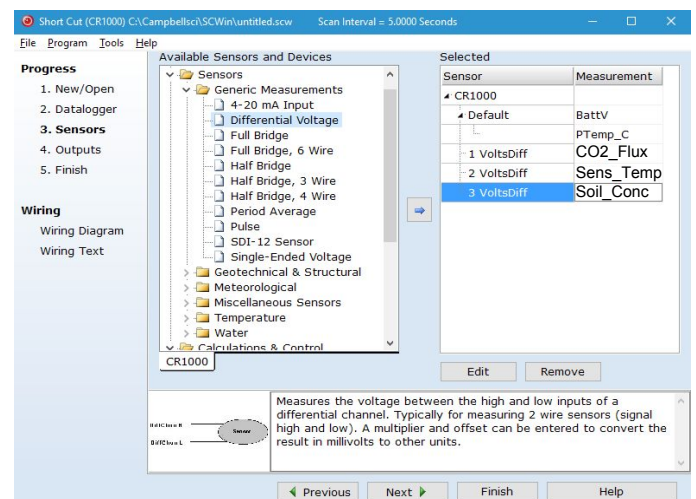


Figure 2: Short Cut differential set-up

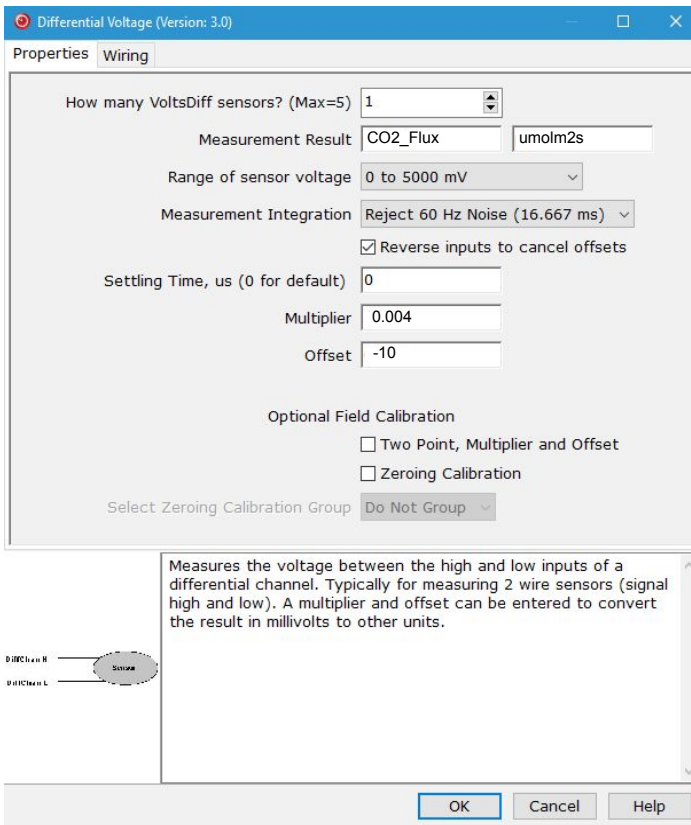


Figure 3: Short Cut properties box

### Single-Ended Mode

If differential mode is unavailable (perhaps due to lack of unused inputs) the eosFD can be connected in single-ended mode, however, this is the least accurate mode and should only be used when there are no other options. Because the eosFD draws large but short-duration current pulses to power its NDIR sensor, pump and valves, a varying amount of voltage is dropped across the ground lead of the cable (an effect that gets worse with longer cables). This time-varying noise signal can be diminished by moving the eosFD power connector to an isolated power supply (i.e. separate from the CR1000's supply with no common ground connection) as shown in Figure 5. The configuration in Short Cut uses "Single-Ended Voltage" as the sensor type, but all other settings are the same as for differential mode (Table 1).

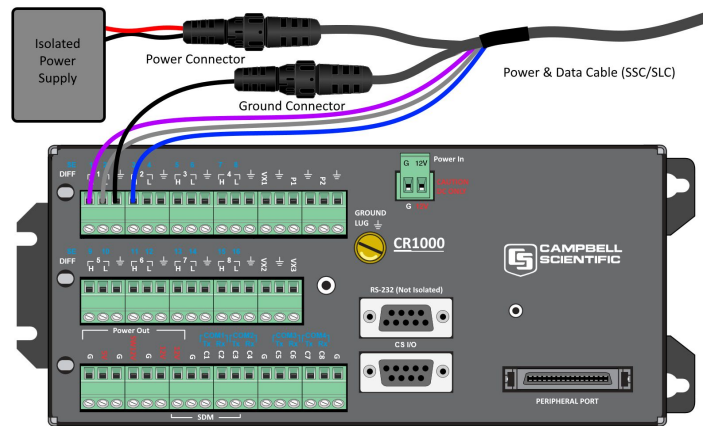


Figure 4: Connecting an eosGP to a CR1000 in single-ended mode ([printable image](#))

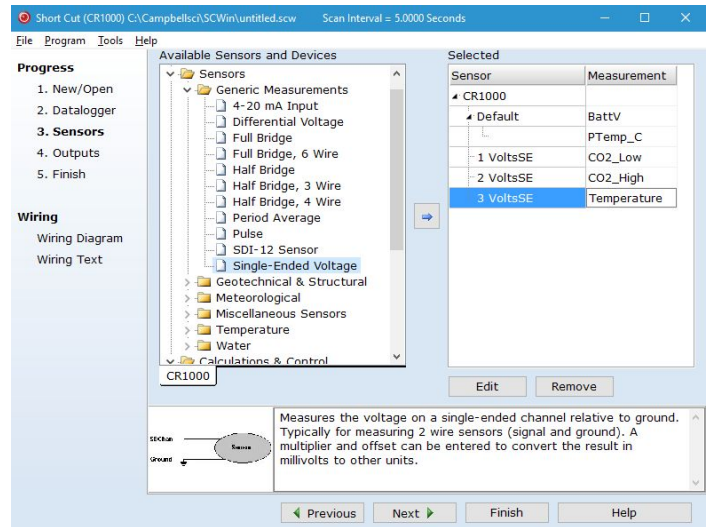


Figure 6: Short Cut single ended set-up

### Conclusion

Whether you choose to use differential or single-ended mode to set up your eosFD with the Campbell Scientific CR1000 data logger, set up should be straightforward to get up and running. Any further questions can be directed to our support team.

### Other Supported Loggers

The eosFD is compatible with many more Campbell data loggers, with slight modifications to the programming and the input locations and style. To the right is a list of data loggers compatible with differential and single ended measurement modes.

- CR6
- CR800
- CR1000
- CR3000