

This document assumes you have experience connecting to your CR1000.

The procedure of interfacing the C-sense is described in two sections:

- Wiring the C-sense to the CR1000
- Running PC200W to configure the CR1000 for data collection

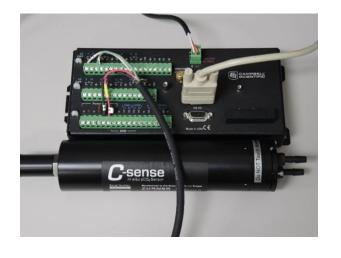
Note: This procedure was developed with Campbell Scientific PC200W 4.2 Build 4.2.0.6. Campbell Scientific PC200W software can be found at the following web address:

http://www.campbellsci.com/downloads?sb=PC200W&c=9999.

1. Wiring the C-sense to the CR1000

There are 4 wires coming from the C-sense: red, black, green, and white. The table below defines their function and where they should connect to the CR1000.

C-sense Pigtail wire color	Function	CR1000 Connection
Red	Supply Voltage: 6-12 VDC	Power Out: 12V
Black	Supply Ground: 0 VDC	Power Out: G
White	Positive Signal to CTD: 0-5 VDC	SE 1(Single Ended)
Green	Negative Signal to CTD: 0 VDC	Ground





In the images above, the white and green wires coming from the C-sense pigtail are connected to the 1st and 3rd cells on the terminal block, respectively. This is representative of a single ended analog sensor connected to Single Ended Channel 1. The red and black wires coming from the C-sense need to be connected to the "Power Out" section of the CR1000. Connect the red wire to a "12V" port under the "Power Out" section, connect the black wire to a "G" port under the "Power Out" section. The image on the right shows these connections in greater detail.



Revision A



- 2. Running PC200W to configure the CR1000 for data collection
  - 2.1 After the CR1000 is powered and connected to your PC using a serial cable, click on "Connect" in the upper left corner of the PC200W Datalogger Support Software.

٢	PC200W 4.2 Datalogger Support Software	- CR1000 ( CR1000 ) – 🗖 🗙
<u>File</u> Datalogger	Network Iools Help	3 3 3
Cr 20	Clock/Program       Monitor Data       Collect Data         Datalogger Information       Datalogger Name: CR1000         Datalogger Type: CR1000       Direct Connect Connection         COM Port: Prolific USB-to-Serial Comm Port (COM14)         Datalogger Settings         Baud Rate: 9600         PakBus Address: 770         Security Code: 0         Extra Response Time: 0s         Data File Paths         Status: C:\Campbellsci\PC200W\CR1000_Status.dat         Public: C:\Campbellsci\PC200W\CR1000_C_sense.dat	Clocks Datalogger PC Pause Clock Update Datalogger Time Zone Offset Set Clock Datalogger Program Current Program C_sense.CR1 Send Program Retrieve Program
		Disconnected

2.2 After connecting, the GUI will display a "Connection Time" in the lower right corner.

Click on the red clock face icon in the toolbar of the PC200W GUI. A new window will open titled "Short Cut".

٢	PC200W 4.2 Datalogger Support Software	- CR1000 ( CR1000 ) – 🗖 🗙
<u>F</u> ile <u>D</u> atalogger <u>N</u>	etwork <u>T</u> ools <u>H</u> elp	
V Dis <u>c</u> onnect	<b>***</b>	<b>3</b> (0)
	Clock/Program Monitor Data Collect Data Datalogger Information	Clocks
CR1000	Datalogger Name: CR1000	Datalog 6/20/2014 10:25:24 AM
	Datalogger Type: CR1000 Reported Station Name: CR1000 1	Dutatog
	Reported Station Name. CK1000_1	PC 6/20/2014 10:25:07 AM
	Direct Connect Connection COM Port: Prolific USB-to-Serial Comm Port (COM14)	Pause Clock Update
	Datalogger Settings Baud Rate: 9600 PakBus Address: 770 Security Code: 0 Extra Response Time: 0s	Set Clock Datalogger Time Zone Offset
	Data File Paths Status: C:\CampbellschPC200W\CR1000_Status.dat Public: C:\CampbellschPC200W\CR1000_Public.dat C_sense: C:\CampbellschPC200W\CR1000_C_sense.dat	Datalogger Program Current Program C_sense.CR1
		Send Program
		Retrieve Program
		Connection Time 0:00:11





Technical Note: Interfacing a C-sense pCO<sub>2</sub> Sensor to a Campbell Scientific CR1000 Datalogger

2.3 Click on the "New Program" button



2.4 Under "Datalogger Model", select CR1000 if it isn't selected already. Designate a "Scan Interval". Click on "Next".

۲	Short Cut (CR1000) C:\Campbellsci\SCWin\untitled.scw Scan Interval = 5.0000 Seconds	- 🗆 🗙
<u>File Program Tools H</u> e	elp	
Progress 1. New/Open 2. Datalogger 3. Sensors	Datalogger Model Select the Datalogger Model for which you wish to create a program.	
4. Outputs 5. Finish	Scan Interval Select the Scan Interval. Seconds Seconds Market Scan Interval. This is how frequently measurements are made.	
Wiring Diagram Wiring Text		
	Previous     Next     Finish     H	elp

If this is the first time running the Short Cut utility, a prompt will appear asking for a choice of ac Noise Rejection. Select 60 Hz for the United States and other countries using 60 Hz ac voltage. Select 50 Hz for Europe and other countries operating on 50 Hz ac line voltage.

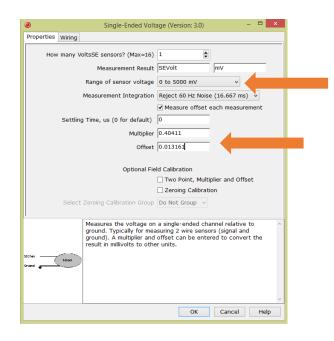




2.5 A new window will open with the left panel titled "Available Sensors and Devices". Expand the "Sensors" folder by clicking the triangle next to it. Expand the "Generic Measurements" folder by clicking the triangle next to it. Highlight the "Single-Ended Voltage" entry by clicking on it once. Click on the right facing arrow in between the left and right panels to add this measurement to the configuration.

۲	Short Cut (CR1000) C:\Campbellsci\SCWin\untitled.scw Scan Interval = 5.0000 Seconds – 🖵 💌						
File <u>Program Tools Hep</u>							
File Progress 1. New/Open 2. Datalogger 3. Sensors 4. Outputs 5. Finish Wiring Wiring Diagram Wiring Text	dp       Available Sensors and Devices       Selected         Valiable Sensors       Sensors       Measurements         + 0 An Input       CR1000       BattV         - Cruli Bridge, 6 Wire						
	Ground -						
	Previous     Next     Finish     Help						

2.6 A new window will open titled "Single-Ended Voltage (Version 3.0)". Click next to the dropdown menu titled "Range of sensor voltage" and select "0 to 5000 mV", it is the first entry in the list. Within the "Multiplier" and "Offset" fields, enter the slope and offset from the calibration sheet of your C-sense. The values from the calibration sheet must be in units of millivolts. Click on "OK". The "Single-Ended Voltage (Version 3.0)" window will close. Click on "Next" in the remaining Short Cut GUI.







2.7 The left panel now reads, "Selected Sensors" and the right panel reads "Selected Outputs". Under "Selected Sensors", highlight the last entry, "VoltsSE", by clicking it once. Click once on the "Sample" button in between the left and right panel. This action will add the "VoltsSE" to the Selected Outputs panel. Take note of the "Table Name" under "Selected Outputs", as this is the name of the text file that will be created when you retrieve data from the CR1000. In this case, it is named "C\_sense". Populate the "Store Every" field with the same value you used for Scan Interval in step 4. Click on "Finish".

Short Cut (CR1000) C:\Campbellsci\SCWin\untitled.scw       Scan Interval = 5.0000 Seconds     -								
Eile Program Iools Help								
Progress	Selected Sensors	(		Selected Outputs				
1. New/Open	Sensor	Measurement	Average	Table Name C_s	sense			
2. Datalogger	▲ CR1000		ETo	Store Every 5		Seconds	~	
3. Sensors	▲ Default	BattV	Maximum	PCCard				
	L	PTemp_C	Minimum			Deiter		
4. Outputs	VoltsSE	SEVolt	Sample	SC115 CS I/O	-to-USB Flash M	emory Drive		
5. Finish				Sensor	Measurement	Processing	Output Label	Units
			Strev	VoltsSE			SEVolt	m∨
Wiring								
Wiring Diagram			Wine ctor					
Wiring Text								
			_					
				1 C_sense 2	Table2			
	Advanced Outputs (a	ll tables)		Add Table	Delete Table	Edit	Remo	ve
					Previous	Next	Finish	Help

2.8 A new GUI will open asking you to save the program configuration (\*.scw). After you save, the software will ask you if you wish to send program to the datalogger, click "Yes".

۲	Short Cut (CR1000) C:\campbellsci\SCWin\C_sense.scw Scan Interval = 5.0000 Seconds	- 🗆 🗡
<u>File Program Tools H</u>		
Progress	Results Summary Advanced	
1. New/Open	Short Cut File	
2. Datalogger	Your Short Cut program settings have been saved in: C:\campbellsci\SCWin\C_sense.scw	
3. Sensors	Datalogger Program Successfully Generated!	
<ol><li>Outputs</li></ol>	The following datalogger program has been created: C:\campbellsci\SCWin\C_sense.CR1	
5. Finish	Use PC200W, PC400, LoggerNet, RTDAQ, or VisualWeather to transmit C:\campbellsci\SCWin\C_sense.CR1 to the CR1000. Or, you can send the program to the datalogger now. Send Program	
Wiring		
Wiring Diagram		
Wiring Text	Confirm	
	The program was created successfully. Do you wish to send the program to a datalogger?	
	Yes No	
	Print	
	Previous     Next     Finish	Help

2.9 Within the GUI referenced in step 7, you will notice two file types are created from this operation, the C\_sense.scw file is the PC200W software configuration representing the C-sense interface to the CR1000. The file that is delivered to and compiled by the datalogger is C\_sense.CR1. The delivery of the \*.CR1 file will cause all data on the CR1000 to be deleted. The GUI will prompt you if this is OK. Click "Yes".





Technical Note: Interfacing a C-sense pCO<sub>2</sub> Sensor to a Campbell Scientific CR1000 Datalogger

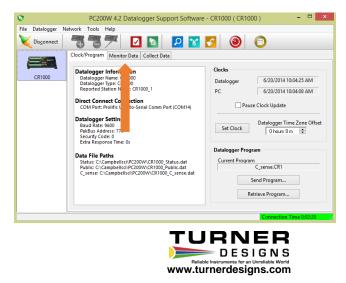
۲	Short Cut (CR1000) C:\campbellsci\SCWin\C_sense.scv Scan Interval = 5.0000 Seconds – 🗖	×				
<u>File Program T</u> ools <u>H</u>						
Progress	Results Summary Advanced					
1. New/Open	Short Cut File					
2. Datalogger	Your Short Cut program settings have been saved in: C:\campbellsci\SCWin\C_sense.scw					
3. Sensors	Datalogger Program Successfully Generated!					
4. Outputs	The following datalogger program has been created: C:\campbellsci\SCWin\C_sense.CR1					
5. Finish	Use PC200W, PC400, LoggerNet, RTDAQ, or VisualWeather to transmit C:\campbellsci\SCWin\C_sense.CR1 to the CR1000. Or, you can send the program to the datalogger now. Send Program					
Wiring						
Wiring Diagram						
Wiring Text						
	Warning					
	Sending a program will cause data on the datalogger to be erased. Are you sure you wish to proceed?					
	Yes No					
	Print					
	Previous Next Finish Help					

2.10 After clicking "Yes", one last GUI will appear titled "Download C\_sense.CR1". Click "Send".

Download C_sense.CR1					
Select the destination	Run Options				
CR1000	<ul> <li>Run Now</li> <li>Preserve data if no table changed</li> <li>Delete associated data tables</li> </ul>				
Compress File					
Send Cancel	Help				

The settings shown above are the default. They will cause the program to run immediately, as well as after powering, in the event that power is cycled.

- 2.11 After successful compilation, a window will open titled, "Compile Results". Click on "OK".
- 2.12 Exit out of the Short Cut utility. Click on the "Monitor Data" tab.





2.13 Depending on the previous operation of the CR1000, you may or may not see data in the spreadsheet. If you see data, as in the example below, highlight the name of the variable, and then click "Delete". Do this for all the variables present.

۲	PC200	W 4.2 Datal	ogger Supp	ort Softwa	re - CR1000 (	(CR1000)	-	
<u>File D</u> atalogger <u>N</u>	etwork <u>T</u> ools	<u>H</u> elp						
V Disconnect	33	🤊 🔽		P 省	<b>S</b>	) ()		
	Clock/Program	Monitor Data	Collect Data					
CR1000			Decimal P	laces: 2	Update	Interval: 00	m 01 s 🗦	
	RecNum	77						
	TimeStam	14:38:13						
	BattV	12.18						
	PTemp_C	24.72						
	SEVolt	672.51						
	ļ					Co	nnection Time (	):22:42

2.14 When the spreadsheet is empty, click on the "Add" button. A new GUI will open titled "Add Selection". Under the "Tables" column, highlight the "C\_sense" entry. The associated fields of "RecNum", "TimeStamp", and "SEVolt" will appear under the "Fields" column. Click on "Paste". The variables under the "Fields" column will now be in the spreadsheet and updating according to your sampling interval. Click on "Close".

PC20	00W 4.2 Datalogger Sup	port Software - CR1000 ( CF	x1000) – 🗆 🛛
File Datalogger Network Tools	Help		
	Add	Selection	0
CR1000	Tables C_sense Public Status	Fields RecNum TimeStamp SEVolt	val: 00 m 01 s
	🗌 Stay On Top	List Alphabetically Paste Close	
			Connection Time 0:11:36





2.15 You will see the "RecNum" field increasing at a rate of one every Scan Interval (in this case 5 seconds). This represents record number. The time stamp will be displayed ("TimeStamp"), and the ppm of CO<sub>2</sub> measured by the C-Sense ("SEVolt"). At this point, the CR1000 is logging data.

۲	PC200W 4.2 Datalogger Support Software - CR1	000 ( CR1000 ) – 🗆 🗙
File Datalogger No	twork Tools Help	
Dis <u>c</u> onnect	***	
	Clock/Program Monitor Data Collect Data	
CR1000	Add Delete Port/Flag Decimal Places: 2	Ipdate Interval: 00 m 01 s 💌
	RecNum 164	
	TimeStamp 14:31:00	
	SEVolt 1,487.00	
		Connection Time 0:13:20

