Warranty and Assistance

The SS100 SENSOR SIMULATOR is warranted by Campbell Scientific, Inc. to be free from defects in materials and workmanship under normal use and service for twelve (12) months from date of shipment unless specified otherwise. Batteries have no warranty. Campbell Scientific, Inc.’s obligation under this warranty is limited to repairing or replacing (at Campbell Scientific, Inc.’s option) defective products. The customer shall assume all costs of removing, reinstalling, and shipping defective products to Campbell Scientific, Inc. Campbell Scientific, Inc. will return such products by surface carrier prepaid. This warranty shall not apply to any Campbell Scientific, Inc. products which have been subjected to modification, misuse, neglect, accidents of nature, or shipping damage. This warranty is in lieu of all other warranties, expressed or implied, including warranties of merchantability or fitness for a particular purpose. Campbell Scientific, Inc. is not liable for special, indirect, incidental, or consequential damages.

Products may not be returned without prior authorization. The following contact information is for US and International customers residing in countries served by Campbell Scientific, Inc. directly. Affiliate companies handle repairs for customers within their territories. Please visit www.campbellsci.com to determine which Campbell Scientific company serves your country.

To obtain a Returned Materials Authorization (RMA), contact Campbell Scientific, Inc., phone (435) 753-2342. After an applications engineer determines the nature of the problem, an RMA number will be issued. Please write this number clearly on the outside of the shipping container. Campbell Scientific's shipping address is:

CAMPBELL SCIENTIFIC, INC.
RMA#_____
815 West 1800 North
Logan, Utah 84321-1784

For all returns, the customer must fill out a “Declaration of Hazardous Material and Decontamination” form and comply with the requirements specified in it. The form is available from our website at www.campbellsci.com/repair. A completed form must be either emailed to repair@campbellsci.com or faxed to 435-750-9579. Campbell Scientific will not process any returns until we receive this form. If the form is not received within three days of product receipt or is incomplete, the product will be returned to the customer at the customer’s expense. Campbell Scientific reserves the right to refuse service on products that were exposed to contaminants that may cause health or safety concerns for our employees.
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SS100 Sensor Simulator

1. General

The SS100 is a device used when the Campbell Scientific CR1000/LoggerNet Training Course is taught out-of-house. The SS100 is powered by a nominal 12VDC power source, typically the datalogger itself, and provides several outputs typical of those from sensors commonly measured by Campbell Scientific dataloggers.

The Training Course instructors may use the SS100 in a variety of simulations of their own choosing or use the analogies in this manual.

2. Specifications

Supply Voltage
12VDC

Analog Outputs
0-2.2 VDC

Pulse Outputs
High Frequency Pulse: 0-5 VDC, 3-140 Hz, non-linear
Low Level AC: 1 VDC, 3-140 Hz, non-linear

Bridge Measurement
Full bridge circuit
Fixed resistors 5 Kohm
Variable resistor 10 Kohm

Switch Closure
Momentary push button switch, normally open
Approximate duration: 135 ms

3. Wind Speed and Direction Simulation

Sensor: Wind Speed and Direction

Wind Direction (Use SS100 Analog Output)
Range: 0-360°
Accuracy: +/- 3%
Resolution: 1°
Wind Direction Voltage: 0-2200 mVDC

Wiring

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<tr>
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<th>CR1000</th>
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Multiplier and offset calculation:
Multiplier = 360 degrees / 2200 mV
Offset = 0
CRBasic Measurement Instruction:

VoltSe (WindDir,1,mv2500C,1,1,0,60Hz,360/2200,0)

Wind Speed (Use SS100 High Frequency Pulse Output)
Range: 0-50 m/s
Accuracy: +/- 5% > 5 m/s or 0.2 m/s < 5 m/s
Resolution: 0.1 m/s
Wind Speed Output: Linear, Calm = 3Hz, 50 m/s = 140 Hz

Wiring

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Multiplier and offset calculation:
Using the equation of a line with two known points (0,3) and (50,140):
y=mx + b; m = (50-0) / (140-3) = 0.365 m/s / Hz
b=y-mx; 50 - .365(140) = -1.095 m/s

CRBasic measurement instruction:
PulseCount (WS_ms,1,1,0,1,.365,-1.095) 'configured for high frequency

CR1000 Wind Speed and Wind Direction Example

'CR1000 Series Datalogger

'Declare Public Variables
Public WS_ms, WindDir

'Define Data Tables
DataTable (SS100,true,-1)
  DataInterval (0,60,Sec,10)
  WindVector (1,WS_ms,WindDir,FP2,False,0,0,0)
  FieldNames ("WS_ms,WindDir,WindDir_SD1")
EndTable

'Main Program
BeginProg
  Scan (1,Sec,0,0)

    'Analog Output - Simulated Wind Direction
    VoltSe (WindDir,1,mv2500C,1,1,0,60Hz,360/2200,0)

    'Pulse Output - Simulated Wind Speed
    PulseCount (WS_ms,1,1,0,1,.365,-1.095) 'high frequency Hz

    'Call Output Tables
    CallTable SS100

  NextScan
EndProg
4. Tipping Bucket Rain Gage Simulation

Sensor: Tipping Bucket Rain Gage

Signal Output: Momentary switch closure activated by tipping bucket mechanism.

Rainfall per tip: 0.01 in.

Wiring

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CR1000 Tipping Bucket Rain Gage Simulation Example

```plaintext
'DCR1000
'Declare Variables and Units
Public rain_fall

Units rain_fall=inch

'Define Data Tables
DataTable (rain_fall,True,-1)
  DataInterval (0,1,Min,0)
  Totalize (1,rain_fall,FP2,0)
EndTable

'Main Program
BeginProg
  Scan (1,Sec,1,0)
    'Tipping bucket 0.01" per tip.
    PulseCount (rain_fall,1,2,2,0,0.01,0)
    CallTable (rain_fall)
  NextScan
EndScan
EndProg
```

5. Water Level Pressure Transducer Simulation

Sensor: Submersible pressure transducer

Input: Precise excitation voltage 2.5 VDC

Output: Full bridge differential voltage, linear output, maximum negative voltage equivalent to zero pressure, maximum positive output equivalent to maximum pressure. Must calibrate in field to determine offset and maximum and minimum pressures.
SS100 Sensor Simulator

Wiring

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<tr>
<td>V1out</td>
<td>2H</td>
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<td>V2out</td>
<td>2L</td>
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Multiplier and offset calculation:
Results with mult = 1, offset = 0, minimum depth = -177, maximum = 500. Assuming the range of the sensor is 0-100 feet, calculate the multiplier and offset using equation of line; m = 0.15, offset = 26.14.

CRBasic measurement instruction:
BrFull (depth_ft,1,mv2500C,2,Vx1,1,2500,True,True,0,_60Hz,0.15,26.14)

CR1000 Water Level Pressure Transducer Simulation Example

`'CR1000 Series Datalogger`

`'Declare Public Variables`
Public depth_ft

`'Define Data Tables`
DataTable (SS100,true,-1)
  DataInterval (0,60,Sec,10)
  Minimum (1,depth_ft,FP2,0,False)
EndTable

`'Main Program`
BeginProg
  Scan (1,Sec,0,0)
    `'Bridge Measurement - Simulated Water Level`
    BrFull (depth_ft,1,mv2500C,2,Vx1,1,2500,True,True,0,_60Hz,0.15,26.14)

  `'Call Output Tables`
  CallTable SS100

NextScan
EndProg