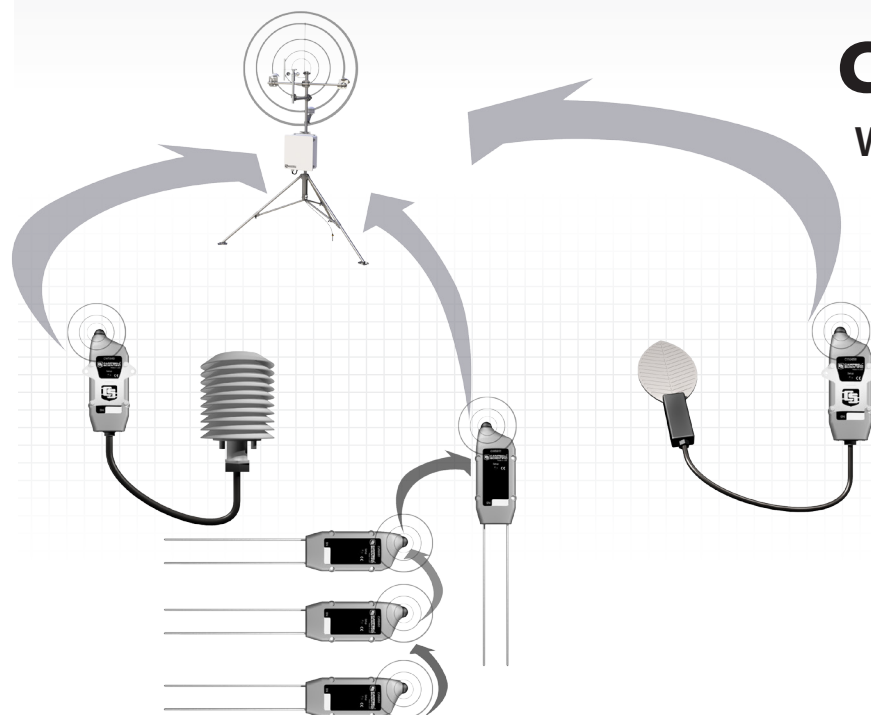# CAMPBELL SCIENTIFIC®
WHEN MEASUREMENTS MATTER

Campbell Wireless Sensor Network

Cable-Free Sensors
Wireless network means flexibility, cost savings, time savings

Common Measurements

- Surface temperature
- Soil dielectric permittivity
- Soil bulk electrical conductivity (EC)
- Soil temperature
- Soil heat flux
- Air temperature
- Relative humidity

- Solar radiation
- Wind speed
- Wind direction
- Precipitation
- Dissolved oxygen
- Leaf wetness

Overview

A Campbell Wireless Sensor Network (CWSN)[a] consists of a CWB100 Wireless Base Station and one or more wireless sensors. The base station serves as the gateway to the network, communicating with a Campbell Scientific CR800-series, CR1000, or CR3000 datalogger via a control port as specified in the CRBasic CWB100() instruction. Up to four CWB100s can be connected to one CR1000 or CR3000; up to two CWB100s can be connected to one CR800.

The base station communicates with all of the wireless sensors in the network using its own sensor network protocol. Any sensor can serve as an RF repeater to communicate with other wireless sensors. A sensor can route its transmissions through up to three other sensors on the way back to the base station.

Benefits and Features

- Require less installation time and labor than running cables through conduit or burying them in trenches
- Can be used in buildings where local fire codes preclude the use of certain types of sensor cable
- Ideal for applications that would require long cable lengths, which often decrease the quality of the measurement
- Use fewer datalogger channels

- Wireless sensor transmissions can be routed through up to three other wireless sensors
- Internal frequency-hopping, spread spectrum radio provides longer range and less interference
- Wireless sensors are battery-powered using either alkaline batteries or a rechargeable battery and a solar cell
- Compatible with Campbell Scientific's CR6, CR800, CR850, CR1000, and CR3000 dataloggers

[a]Campbell Scientific's wireless sensor networks are not meant to move a lot of data quickly. It takes 15 to 30 seconds per hop when moving data from a sensor, through a sensor used as a repeater, and ending up at the base radio. Going through three repeaters could take a data packet anywhere from 45 to 90 seconds to get to the base radio. Campbell Scientific recommends

How does it work?

The CWB100 Wireless Base Station and one or more wireless sensors are first configured using Campbell Scientific's Wireless Sensor Planner, Network Planner, or Device Configuration Utility (DevConfig) Software. Wireless sensors interface with the PC for configuration via the A205 CWS Sensor to PC Interface. One A205 is required per wireless system.

The datalogger is programmed to interface with the CWB100 and determine a polling interval. The sensors are synchronized to measure at the top of the datalogger's scan interval. The base station polls all sensors and stores the collected data early enough that it can transfer the data as soon as the datalogger requests it. This minimizes the amount of time the datalogger needs to wait for a response from the network through the CWB100 base station.

At the start of each polling interval, the datalogger polls the base station, and sensor values are transferred to the datalogger for storage. This method of data transfer from the sensors to the datalogger provides the fastest and lowest power method available.

Components

1. Datalogger
2. CWB100 Base
3. Datalogger Power Supply
4. Environmental Enclosure
5. Wireless sensors (shown are CWS900 attached to a HC2S3 Temperature and RH sensor, CWS900 attached to a LWS Leaf Wetness Sensor, and four CWS655 Soil Water Sensor)
6. A205 Interface (one required per system)
7. USB Cable (shipped with the A205)
8. PC or laptop running Campbell Scientific's Wireless Network Planner, Network Planner, or Device Configuration Utility
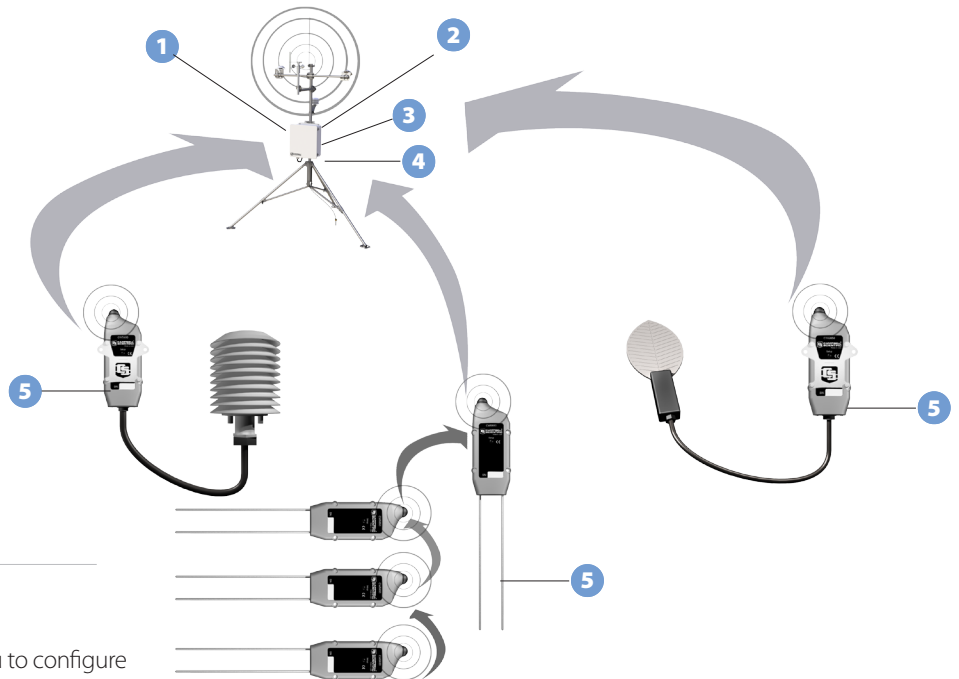
Customizations

The CWSN is completely customizable, allowing you to configure the station to your project's specifications, while retaining turn-key functionality. The following outlines the components that are available:

Sensors

Sensors can be removed, added, or swapped out with models that meet your project's requirements.

› CWS220 Wireless Infrared Radiometer
› CWS655 Soil Water Sensor
› CWS900 Wireless Sensor Interface allows a sensor with a special connector to be used in the CWSN. Campbell Scientific offers a wide variety of meteorological sensors that have this connector. A complete list of compatible sensors is available at: www.campbellsci.com/cws900

Datalogger

› CR6 Measurement and Control Datalogger
› CR800 Measurement and Control Datalogger
› CR850 Measurement and Control Datalogger
› CR1000 Measurement and Control Datalogger
› CR3000 Measurement and Control Datalogger