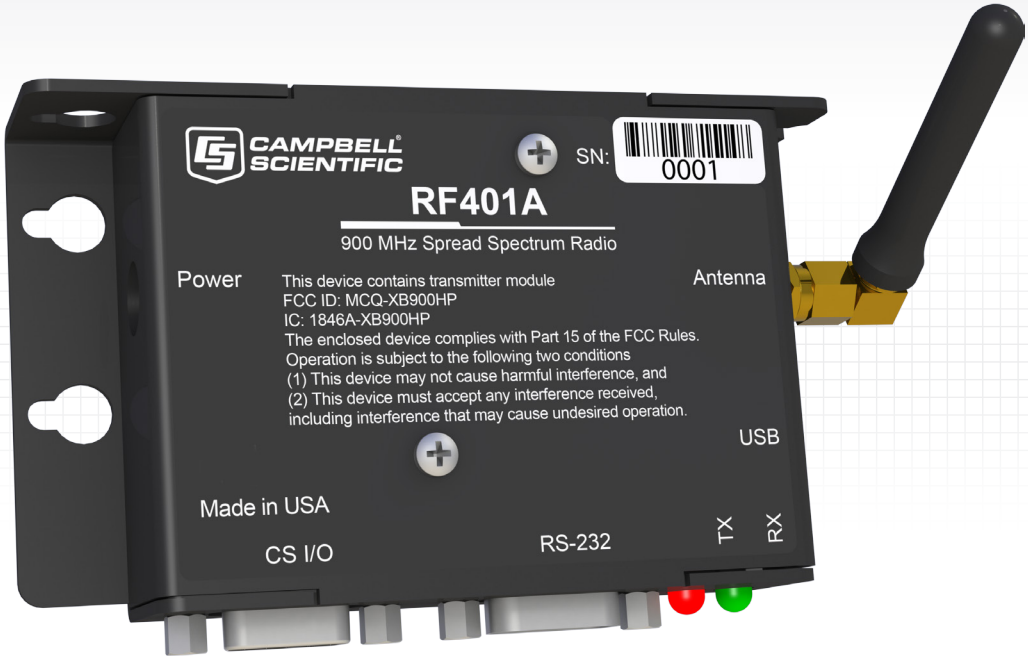
CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

RF401A and RF411A

900 MHz, 250 mW, Spread Spectrum Radios



Overview

The RF401A[a] and RF411A[a] radios can be used for general purpose wireless data communications and support point-to-point and point-to-multipoint datalogger communications. Spread spectrum radios can serve as a field modem/radio while connected to the datalogger or as a base station modem/radio while connected to a PC. They can also serve as a PakBus RF router/repeater.

Spread spectrum radios spread the normally narrowband information signal over a relatively wide band of frequencies. This allows the communications to be highly immune to noise and interference from RF sources such as pagers, cellular phones and multipath.[b] The RF401A and RF411A radios reduce susceptibility to RF interference from other spread spectrum devices by providing user-selectable frequency hopping patterns.

Benefits and Features

- Long range, wireless communications between devices
- Hassle-free operation in many countries where license-free operation[c] is allowed
- Low average power consumption
- Optimized for Campbell Scientific PakBus networking
- Improved RF efficiency when using PakBus protocol compared to other third party solutions
- Low-cost, stand-alone operation when a dedicated PakBus RF repeater is needed
- Able to connect to a datalogger or other peripherals for Internet, radio, or telephone backhaul

[a] The RF401A-series radios are recommended for existing installations that require compatibility with products such as the RF401-series, CR206X, CR211X, AVW206, and AVW211. For new installations, Campbell Scientific recommends using the RF407-series or RF451 radios.

[b] The operating frequency band of these radio modems may be shared with other non-licensed services such as cordless telephones and with licensed services including emergency broadcast and air-traffic control.

[c] Spread spectrum radios, like all FCC Part 15 devices, are not allowed to cause harmful interference to licensed radio communications and must accept any interference that they receive. Most Campbell Scientific users operate in open or remote locations where interference is unlikely. If there is a problem, interference can be reduced using methods such as moving the device, reorienting or using a different type of antenna, or adding RF shielding.

System Components

Radios

A spread spectrum radio needs to be at both the base station and field site. The chart below shows the spread spectrum radios that each model can communicate with:

Model	Where Used	Frequency	Communicates With
RF401A	U.S., Canada	910 to 918 MHz	RF401A, RF401, RF400, RF430, CR206(X), CR205, AVW206
RF411A	Australia, New Zealand	920 to 928 MHz	RF411A, RF411, RF410, RF431, CR211(X), CR210, AVW211

Powering the Radio

At the base station, the radio typically uses ac power that is either supplied by the #15966 wall charger or through the PC via the USB port and cable. At the field site, the radio is typically powered by the datalogger through the CS I/O port. The #14291 Field Cable can also be used to connect the radio to an appropriate 12 Vdc power supply. This field cable is required when the radio is connected to the datalogger's RS-232 port instead of the CS I/O port or when the datalogger was purchased before December 1997.

Antennas

Campbell Scientific offers a variety of antennas for this radio. The following inexpensive, omnidirectional whip antennas connect directly to the radio (no cable required) and can transmit short distances (up to 1 mile).

- 14204 0 dBd, 1/2 wave with right-angle joint
- 15731 0 dBd, 1/4 wave with 5.1 cm (2 in) length
- 15730 0 dBd, 1/4 wave with right-angle joint

The 15970 dipole antenna includes adhesive for window or wall mounting and a cable for connecting to the radio.

Our higher gain #14221 omnidirectional and #14201 Yagi antennas require a cable to connect them to the radio. The #31314 surge protector is available for susceptible to lightning or electrostatic buildup or when the cable length needs to be longer than 3 m (10 ft), as measured between the transceiver and the antenna.

Specifications

- Type: Frequency Hopping Spread Spectrum (FHSS) Transceiver
- RS-232 Baud Rate: 1200 bps to 115200 bps
- Channel Capacity: 7 hop sequences share 25 frequencies
- Frequency Hopping Patterns: 7 different selectable patterns
- Frequency Control: Direct FM
- Receiver Sensitivity[d]: -109 dBm
- Operating Temperature Range
  Standard: -25° to 50°C
  Extended: -40° to 85°C
- LEDs: Power on, TX, RX, diagnostics
- Transmitter Power Output: 5 mW to 230 mW, software configurable
- Power: 9 to 16 Vdc
- Average Current Drain
  Transmit: < 80 mA (250 mW TX Power)
  Receive: 15 mA
  Stand-by: < 0.5 mA (depending on power saving mode)
- Certifications
  United States (FCC Part 15.247): MCQ-XB900HP
  Industry Canada (IC): 1846A-XB900HP
  RoHS compliant
  C-TICK Australia: Yes, N3013 (RF411A only)
- Antenna Connector: Reverse polarity SMA (RPSMA)
- USB Type B Jack
- RS-232 Connector: 9-pin D-sub female (4 wire: Tx, Rx, CTS, GND)
- CS I/O Connector: 9-pin D-sub male
- Power Connector: 2.5 mm DC power jack
- Dimensions[e]: 11.1 x 6.9 x 2.7 cm (4.4 x 2.7 x 1.1 in)

[d]Campbell Scientific protocols will issue retries wherever a bit error occurs.

[e]Dimensions are from the tip of antenna connector to other side of case, and from the bottom of case to the top of DB9 connector jack screw. The width includes the thickness of the screw heads on the screws that hold the case together.