Introduction

The quick deploy guide is a reference tool outlining the setup process. Keep this document with the CRVW3 for future reference. The CRVW3 Owner's Manual is the definitive source for detailed setup, configuration, and installation instructions.

www.campbellsci.com/crvw3

Quick Deploy Contents

- Hardware Overview
- VSPECTM Overview
- Deployment Instructions:
  - Precautions
  1. Software
  2. Setup & Configuration
  3. Sensor Connection
  4. Power Options
  5. Field Installation
  6. Data Collection & Communications
  7. Radio Network Basics
  8. Maintenance

Quick Deploy Instructions

Deployment Instructions:

1. Precautions
2. Quick Deploy Contents
3. Quick Deploy Instructions

Hardware Overview

CRVW3

- Lid screws
- Battery
- Battery hinge pin
- Battery connection
- Charge/solar input
- USB connection
- Enclosure lock
- CRVW3 wiring panel
- Serial number
- Radio diagnostics
- LED indicators
- Sensor cable entry (x3)
- Charge cable entry
- Antenna connection
- Ground lug

Rechargeable battery option shown, the hinge pin can be removed and the hinge replaced to allow with battery option in fit

The radio diagnostic port is only for the –RF451 option

1. RF451 option
2. BPSMA antenna connection

CRVW3 with enclosure

CRVW3 without enclosure (NE option)

VSPECTM Overview

VSPECTM provides the best vibrating wire measurement available2. Sensor frequency is easily identified while filtering out environmental and electrical noise that affects the quality of other vibrating wire readers. VSPECTM provides measurement diagnostics to understand sensor response, installation quality, and identify incorrect wiring or damaged sensors.

Output and Diagnostics

Sensor Frequency (Hz)

Frequency is the basic measurement from a vibrating wire sensor. The frequency can be converted into engineering units (pressure, displacement, etc.) and is identified as the largest measured amplitude signal within the frequency sweep.

Sensor Amplitude

Signal strength from the vibrating wire sensor. Amplitude varies and is affected by the sensor type, excitation strength (adjustable), and sensor cable length.

Signal-to-Noise Ratio

The signal-to-noise ratio is calculated as sensor signal amplitude divided by the largest noise amplitude within the sweep frequency. A low signal-to-noise ratio indicates a weak sensor signal or a noisy environment.

Measurement Graphs

The following two sets of graphs illustrate the use of VSPECTM to identify a sensor signal in a quiet and noisy environment. Both graphs were created from the same sensor using the Vibrating Wire Report created using a Vibrating Wire Report Generator. Fig. 1 was measured in an electrically quiet environment, while Fig. 2 was measured in an electrically noisy environment (45 Hz) similar to what can be seen in a field environment (power lines, motors, radio signals, etc.). The time series on Fig. 1 shows a relatively clean signal that is more clearly identified in the frequency spectrum. The time series on Fig. 2 shows the influence of the noise. Vibrating wire readers that only use the time series to determine the frequency may report an incorrect frequency as a result of noise. The frequency spectrum (VSPECTM) filters these noise and easily identifies the sensor signal. VSPECTM provides noise immunity by correctly identifying the sensor signal and ignoring the influence of electrical noise that plagues time-domain-based vibrating wire readers.

1. The Frequency Spectrum graph shows signals with respect to frequency (VSPECTM)
2. The sensor signal is determined as the largest signal within the frequency sweep
3. The Time Series graph shows raw signals observed with respect to time
4. A time series with minimal noise influence
5. The frequency sweep is shown as a white area on the graph, only signals within the frequency sweep will be considered as a possible sensor signal

Noise Frequency (Hz)

The largest amplitude noise signal within the frequency sweep.

Decay Ratio (Hz)

Signal attenuation, how quickly the signal strength decreases.

Thermistor/RTD Resistance (ohms)

Used to calculate sensor temperature and correct for thermal effects.

Precision values for RTD are ± 0.3% off, +/– 2.5% of the true value. Precision values for Thermistor are ± 2 degrees, +/– 5 degrees of the true value. Precision values used to describe the quality of the frequency measurement. Temperature measurement (when present) can be used in the CRVW3, and other datalogger or post-processed to apply a thermal correction.

Figure 1: VW Signal

Noise is identified and ignored

A sensor signal is easily identified even when noise is present in the measurement

A time series with observable noise

Noise in the time series (this is what confuses non-VSPECTM Devices)

Figure 2: VW Signal With Noise

Figure 3: Temperature Measurement Graphs

Figure 4: Frequency Spectrum Graph

Figure 5: Frequency Spectrum Graph

VSPECTM provides measurement diagnostics to understand sensor response, installation quality, and identify incorrect wiring or damaged sensors.
3 Sensor Connection

- Loosen and remove plug from cable entry location (bottom of enclosure)
- Insert cable from the outside
- Connect the sensor to the CRW3 wiring panel as described in the table and illustration below
- Hand-tighten the cable entries (Do Not Over Tighten)

4 Power Options

- Connect the battery cable (rechargeable or alkaline D-cells) to the CRW3 wiring panel
- Connect solar panel (optional) to charge “+” & “-”
- Connect the battery cable (rechargeable or alkaline D-cells) to the CRW3 wiring panel
- Thermistor leads are similarly interchangeable.
- A 10 Watt solar panel is commonly used, however a 5 or 20 Watt may also be used depending on site-specific communications and location

5 Field Installation

- A small antenna may be connected directly to the enclosure. For longer distance communications, a higher gain or directional antenna with an exterior cable may be necessary. A surge suppressor kit (pn #31312) is recommended when using cabled antennas.
- Radios can only communicate with similar radios. For example, a CRW3-RF407 can only communicate with other devices that have a built-in RF407 radio option, or are connected to a stand-alone RF407 radio. The only exception to this rule is the CRW3-RF451, which can communicate with other devices that have a built-in RF451 radio option, or are connected to a stand-alone RF451 or RF450.
- Radios can only communicate with similar radios. For example, a CRW3-RF407 can only communicate with other devices that have a built-in RF407 radio option, or are connected to a stand-alone RF407 radio. The only exception to this rule is the CRW3-RF451, which can communicate with other devices that have a built-in RF451 radio option, or are connected to a stand-alone RF451 or RF450.

6 Data Collection & Communications

PC200W, PC400, or LoggerNet Software:
- Create a station in the software for the CRW3 based on specific communication requirements (direct connect, radio, multiple stations, etc.)
- Collect data from the station
- Radio & Automated collections require LoggerNet

7 Radio Network Basics

- DevConfig is used to setup/configure individual settings. Network Planner (LoggerNet) may be used to setup complete networks, or to see the settings that LoggerNet would assign (Puikis addresses, router settings, etc.).
- Select appropriate antennas based on site conditions.
- Successful communications will be aided by:
  - line-of-site between stations
  - raised antenna locations
  - Make sure radio settings match (see table below)

8 Maintenance

Routine maintenance is the best standard of practice to promote a functioning system. Here are some maintenance recommendations; some sites may have more specific maintenance requirements.

- Wipe moisture off lid gasket prior to opening (reduce water ingress)
- Data should be collected at regular intervals
- Clean solar panel with mild detergent and a clean cloth
- Remove any solar barriers (fallen debris, overhead branches, leaves, etc.)
- Minimize moisture intrusion inside the enclosure
- Replace desiccant (pn #6714) and humidity indicator card (pn #28878) as needed
- Check cable entry points for a good seal
- DataMonitor or Troubleshoot tab in DevConfig
- Check grounding rod, grounding cable, and connections
- Check ground rod, grounding cable, and connections
- Inspect for loose connections
- Moisture Protection
- Solar Panel Protection
- Grounding Protection
- Data Collection Protection
- Simple Radio Connection
- Wireless RF407, RF412, RF422, and RF427 Settings
- RF451 Settings
- Only one master radio
- Subnet and Network IDs
- Protocol, power mode, and retry levels
- RF Network and Hop Sequence
- Communications Note: A more thorough discussion on connection methods and advanced communications is found in the CRW3 Manual.