The CRVW3 is a rugged instrument and can provide years of service with proper care and maintenance.

CRVW3 is available field ready with an enclosure and battery or as an individual component. The configuration and operation of the CRVW3 is the same for either option. The enclosure model is field ready while the non-enclosure model allows the user to select an enclosure/battery for specific site requirements.

**Precautions**

- Protect the CRVW3 from over-voltage (16–28 Vdc charge input)
- Protect the CRVW3 from electrostatic discharge (ground properly)
- Protect the CRVW3 from internal moisture (maintain desiccant)
- Protect the CRVW3 from over-voltage (16–28 Vdc charge input)

**VSPECT™ Overview**

VSPECT™ provides the best vibrating wire measurement available. Sensor frequency is easily identified while filtering out environmental and electrical noise that affects the quality of other vibrating wire readers. VSPECT™ 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 (gauge, displacement, etc.) and is identified as the largest measured amplitude signal within the frequency sweep.
  - **Sensor Amplitude** *(mill RMS)*
    - 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** *(unified)*
    - 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 VSPECT™ to identify sensor signals in a quiet and noisy environment. Both graphs were created from the same sensor using the Vibrating Wire Report created using a VWAnalyzer.

**1. Time Series**

- **Frequency** *(Hz)*
  - The largest amplitude signal within the frequency sweep.
- **Decay Rate** *(Hz)*
  - Signal attenuation, how quickly the signal strength decreases.
- **Thermistor/RTD Resistance** *(ohms)*
  - Used to calculate sensor temperature and correct for thermal effects.
- **Present Real/Im* 
  - Frequency and resistance are measured values.
- **Measure Nuoise Ratio** *(unified)*
  - Diagnostic values used to describe the quality of the frequency measurement.

**2. Frequency Spectrum**

- **Frequency Spectrum**
  - Filters the noise and easily identifies the sensor signal.
- **Noise Frequency** *(Hz)*
  - The largest amplitude noise signal within the frequency sweep.
- **Noise Frequency** *(Hz)*
  - The temperature measurement (when present) can be used in the CRVW3, another datalogger or post processed to apply a thermal correction.
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 “+” & “-” (Solar Panel Polarity Matters)
- 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
- Use the supplied standard mounting kit or the Universal Mounting Bracket (pn 30840, shown below) to secure the CRW3 enclosure.
- Connect the ground lug to earth ground. A small enclosure grounding kit (pn 31163) is available for grounding into soil.
- Ensure the lid is securely closed, cable entry points are tightened, and desiccant packs are installed. Orient the enclosure to minimize water entry (typically with cable entries facing downward).

6 Data Collection & Communications
- Requires USB cable (included)
- Supported by all three software packages
- Data can be collected with the CRW3 powered by USB/PC power

7 Data Monitor or Troubleshoot tab in DevCon/f_ig.

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.

- Make sure radio settings match (see table below)
- Successfully communications will be aided by:
  - line-of-site between stations
  - raised antenna locations
- DoConfg 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 (PakBus addresses, router settings, etc.).
- Select appropriate antennas based on site conditions.
- Successfull communications will be aided by:
- Multi RF settings, different radios, or are connected to a stand-alone RF 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.

Universal Mounting Bracket (pn 30840)

Radio Network Basics
- Data Collection & Communications
  - Can utilize one network offsite connection; cell phone, satellite, or other IP connection.
  - A centralized datalogger collects site data into a single device
  - Multiple CRW3 dataloggers connect to a centralized datalogger

Simple Radio Connection
- Good for stations within radio frequency (RF) range of the PC/radio
- Field testing with a laptop and radio

USB Direct Connection
- Supported by all three software packages
- Requires USB cable (included)

Advanced Communications
- Can utilize one network offsite connection; cell phone, satellite, or other IP connection.
- A centralized datalogger collects site data into a single device
- Multiple CRW3 dataloggers connect to a centralized datalogger

Data Collection
- Data should be collected at regular intervals

Solar Panel Protection
- Clean solar panel with mild detergent and a clean cloth
- Remove any solar barriers (fallen debris, overhead branches, leaves, etc.)

Grounding
- Check grounding rod, grounding cable, and connections
- Inspect for loose connections

Moisture Protection
- Minimize moisture intrusion inside the enclosure
- Replace desiccant (pn 6714) and humidity indicator card (pn 26878) as needed
- Wipe moisture off lid gasket prior to opening (reduce water ingress)

Radio Options
- 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.

Antenna Options
- Flashed red - Radio transmit
- Flashed green - Radio receive
- Solid red - Radio error
- Solid orange - Busy (configuring)
- Off - No communications
- Solid green - Measurement
- Flashed green - “Awake” mode, USB, recently configured
- Solid orange - Busy (configuring, or can’t communicate)
- Solid red - Measurement/problem error
- Flashed red - USB power insufficient for measurements
- Off - Device is asleep, waiting for next measurement

Installation Note:
Protect environmentally exposed antenna connections with self-vulcanizing tape (pn 21212) as shown to the right.