

# **FCC Part 15 Subpart C Transmitter Certification**

**Direct Sequence Spread Spectrum Transmitter**

## **Test Report**

**FCC ID: R7PCWE-WALL**

**FCC Rule Part: 15.247**

**ACS Report Number: 06-0096 - 15C**

Manufacturer: Cellnet Technology, Inc.  
Model: Cellnet Water Endpoint 6060 Remote

## **Installation Guide**



# **Cellnet Water Endpoint**

**6060 Remote**

**Installation Guide**

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*Cellnet Water Endpoint*

*6060 Remote*

*Installation Guide*

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## **CHAPTER 1 INTRODUCTION**

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This manual explains how to correctly install Cellnet Water Endpoints (CWE) for remote applications. It covers endpoint installation, encoder register connection, pulse register programming, and troubleshooting.



## TOOLS AND EQUIPMENT

This section outlines the necessary tools and equipment for installing a Cellnet Water Endpoint for remote applications.

### Equipment

The following table contains all required equipment:

**Image**

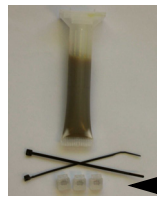
**Description**



Cellnet Water Endpoint Model 6060- Remote with Leads, Single Port



Badger Field Splice Kit 62084-001



Splice Enclosure

Tie wraps

3M Scotchloks, Model UY2 or Equivalent

Dow Corning 4 Electrical Insulating Compound (or equivalent)  
MSDS available at [www.dowcorning.com](http://www.dowcorning.com).



Dow Corning OS-2 silicone Cleaner (or equivalent)  
MSDS available at [www.dowcorning.com](http://www.dowcorning.com).



PIN-IN-TORX  
Requires a TORX driver size T10 with a hole for the PIN



**Image**










**Description**

Additional cable  
Specification: 22-AWG Solid Copper  
Colors: Red/Green/Black  
PVC Jacket

## Tools

The following table contains all required tools:

<u>Image</u>	<u>Description</u>
<p>Magnet located on top left</p> 	RF Buster Magnet P/N 26-1050
	Screwdrivers (flat and Phillips)
	Wire Cutter and Stripper
	Scotchlok® E-9Y Crimping Tool or Equivalent <a href="http://www.3M.com">www.3M.com</a>
	Safety Goggles
	HandHeld Computer <a href="http://www.dap.com">www.dap.com</a>
	Cellnet Remote Water Endpoint Programming Cable

**Image**



**Description**

Neptune ProRead Field Programmer (not required for Auto or ARB 6 encoders)  
[www.neptunetg.com](http://www.neptunetg.com)

## **SAFETY AND ENVIRONMENT**

### **Prerequisite Training**

Installers should be instructed in the following safety elements as well as any site-specific safety issues:

- Hazard Communication (Employee Right to Know)
- Lifting
- Safe driving
- Use of hand tools
- Confined space

### **Preliminary Checks**

The installer should already be able to operate the HandHeld computer. Additionally, you should already have route information and the required number of endpoints.

- Verify that you are at the correct site, specified on the handheld computer or work order.
- Verify that the site is safe for you and your equipment.
- Notify the customer of your presence. Tell the customer that you must have access to the water meter. If necessary, have the customer sign the work order.
- When installing meters, follow any guidelines issued by your company in addition to those given in this guide.
- Never perform an installation during a lightning storm or under excessively wet conditions.

### **Site Requirements**

The site must comply with the following criteria:

- There is no chance that another object will be set over the antenna.
- Some instances may require additional cable.
- Maximum cable length is always 200 feet.

---

## FCC & INDUSTRY CANADA INFORMATION TO THE USER

### FCC Class B

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the Instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Consult Cellnet or an experienced radio technician for help.



**Changes or modifications to this device not expressly approved by Cellnet Technology, Inc. could void the user's authority to operate the equipment.**

### RF Exposure

In accordance with FCC requirements of human exposure to radio frequency fields, the radiating element shall be installed such that a minimum separation distance of 20 centimeters will be maintained.

### Industry Canada

This Class B digital apparatus meets all requirements of the Canadian Interference Causing Equipment Regulations. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Cet appareillage numérique de la classe B répond à toutes les exigences de l'interférence canadienne causant des règlements d'équipement. L'opération est sujette aux deux conditions suivantes: (1) ce dispositif peut ne pas causer l'interférence nocive, et (2) ce dispositif doit accepter n'importe quelle interférence reçue, y compris l'interférence qui peut causer l'opération peu désirée.

**FCC ID: R7PCWEWall**

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

**IC: 5294A-CWEWALL**

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

## CHAPTER 2 INSTALLING THE CELLNET WATER ENDPOINT

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### LOCATING THE CWE

The CWE Remote should be mounted above ground. If there is an existing touchpad or remote, then put the new remote in that location. It is preferred to mount the CWE outdoors, to a wall facing the nearest concentrator.

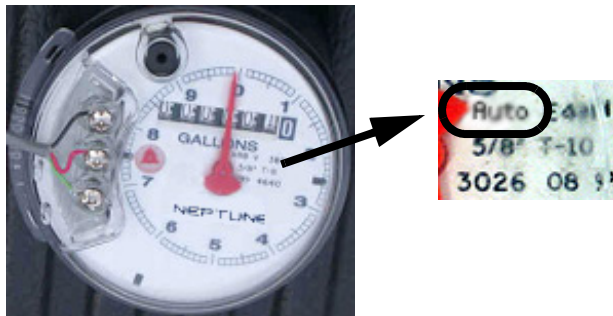
### MOUNTING THE CWE

Mounting techniques vary widely, depending on the physical characteristics of the customer site. The mounting technique used is left to the installer's best judgement and experience.

### IDENTIFYING THE REGISTER FOR INSTALLATION

Register connecting instructions listed by register type:

- If the register has screw terminals, proceed to *"Connecting a Neptune Auto or Sensus Encoder Register with Screw Terminals"* on page 2-3





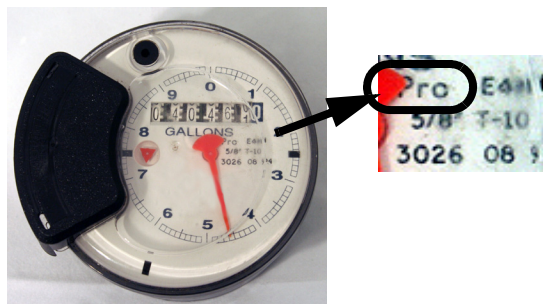
- If the register is a badger RTR with the words “Recordall Transmitter Register” recorded on the face, proceed to “Connecting a Badger RTR Register with Potted Leads” on page 2-9



- If the register is not a Badger RTR and has potted leads, proceed to “Connecting a Badger, Neptune Auto or Sensus Encoder Register with Potted Leads” on page 2-6



- “Pro-Read Encoder Register” on page 2-12



## Connecting a Neptune Auto or Sensus Encoder Register with Screw Terminals

Remove terminal cover. Use clean, disposable towels or rags to wipe the gel away from the terminals and screws. After the gel is removed, disconnect any wires connected to the terminals. Clean the terminals and screws again using Dow Corning OS-2 Silicone Cleaner or equivalent. Be careful not to lose any screws when disconnecting the wires or cleaning the screw terminals.

If the cable to be connected to the screw terminals has been pre-stripped, proceed to step 3 below.

- 1 Using the #10 AWG position (second largest hole) on the 64-1919 wire stripper, remove 1.5 inches of external insulation from the cable.



Figure 2.1 64-1919 Wire stripper



**Do not damage the internal wire insulation when removing the external insulation.**

- 2 Using the #22 AWG wire-stripping hole of 64-1922 tool, strip .5 inch of insulation from each of the three internal wires.



Figure 2.2 64-1922 Wire stripper

- 3 Connect the three-conductor wire to the encoder register's terminals, matching colors carefully: black to black, red to red, green to green. Thread the cable around the strain relief posts of the encoder register.



**Figure 2.3 Threading the cable around the strain relief posts**



Position the end of the cable jacket so that the compound will cover it and it will not be visible when the cover is installed, as shown.

- 4 Apply moisture protection compound to terminal screws and exposed wires (Dow Corning Compound #4 or Novagard® G661™)




**Figure 2.4 Applying moisture compound**






Be sure that the waterproofing compound completely seals the wires. Apply compound under the cable and individual wires. Cover the top of the cable, wires, and screws. Use enough compound so it flows from openings when the cover is attached.

- 5 Snap the cover onto the encoder register.
- 6 Wipe away excess compound.
- 7 Route encoder cable from encoder to the mounted location of the CWE Remote.
- 8 Mount the CWE Remote
- 9 Splice the wires from the CWE Remote to the three wires from the encoder cable.
- 10 Match the colors carefully using the following table

**Table 1**

Encoder Register	6060 Wire Color/Encoder Terminal
Neptune ProRead (ARB VI)	Blk/Green Green/R Red/B 

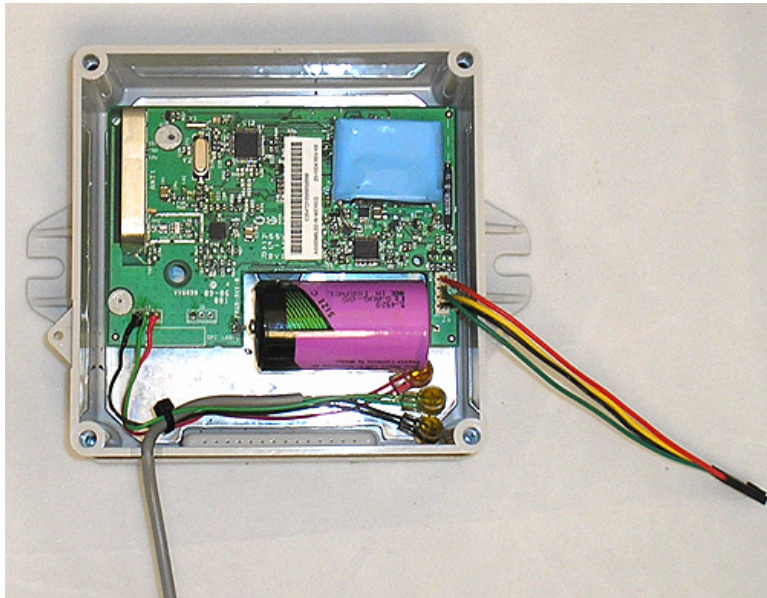
**Table 1**

Sensus ECR-II, ECR-III (ICE)	Blk/Blk Green/G Red/R
	  



All color translations will be done at the CWE Remote. If using existing wire, verify that no color translations are present. If color translations have occurred, replace the splices if possible. Replace the cable if necessary to prevent confusion due to double translation.

- 11 See *Appendix A, Crimping Wires*, for instructions on crimping the wires.
- 12 Dress wires and crimps inside the CWE Remote enclosure as shown.



- 13 Proceed to *Chapter 3, Testing the Endpoint*.

## Connecting a Badger, Neptune Auto or Sensus Encoder Register with Potted Leads

Use the following installation procedure for sites equipped with potted encoders.



**Do not open a potted encoder for any reason. This will void the manufacturer's warranty.**

- 1 Route the cable from the potted register to the CWE mounting location. Splice in additional cable as necessary. When using additional cable, always match colors: black to black, red to red, green to green. All color translations will be done at the CWE Remote.
- 2 Prepare cable end for crimping:
  - a Using the cutting blade portion of the Wire Cutter and Stripper tool, cut the wire connecting the encoder register to the touchpad (or other device). The wire attached to the encoder register should contain at least three wires. If not, replace the encoder register with a 3-wire version.



**Figure 2.5 Wire cutter & stripper**

- b Using the #10 AWG position (second largest hole) on the 64-1919 wire stripper, remove 1 inch of the external insulation from the cable coming from the encoder register. Do not strip the insulation from the internal wires.



**Figure 2.6 64-1919 Wire Stripper**

- c Peel back foil, if present; cut excess foil and uninsulated wire..

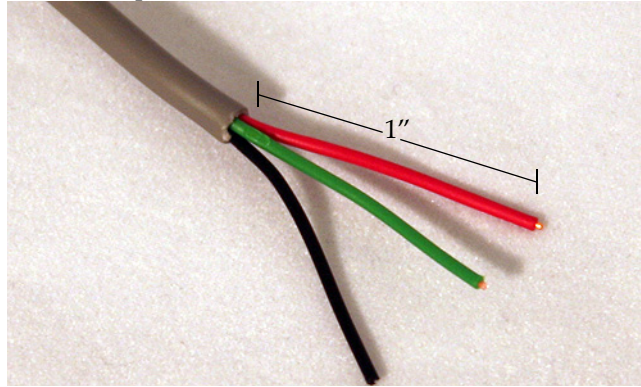


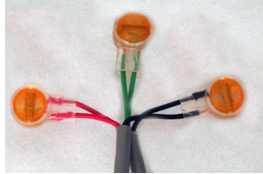

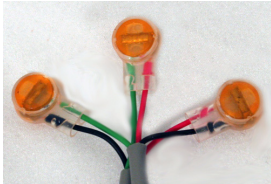

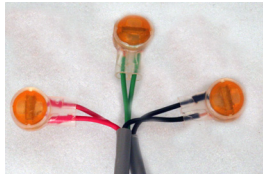

Figure 2.7 3-Wire cable



Do not damage the internal wire insulation when removing the external insulation.

- 3 Splice the wires from the CWE to the encoder wires. Match colors carefully according to the table below:

**Table 2**

Encoder Register	6060 Wire Color/Encoder Terminal
<p>Badger ADE</p> 	<p><b>Blk/Blk Green/Green Red/Red</b></p> 
<p>Neptune ProRead (ARB VI)</p> 	<p><b>Blk/Grn Green/Red Red/Blk</b></p> 
<p>Sensus ECR-II, ECR-III (ICE)</p> 	<p><b>Blk/Blk Green/Green Red/Red</b></p> 

- 4 See *Appendix A, Crimping Wires*, for instructions on crimping the wires.
- 5 Proceed to [Chapter 3, Testing the Endpoint](#).

## Connecting a Badger RTR Register with Potted Leads

Badger manufactures "potted" RTR registers for water meter applications. These registers have a three-conductor cable already attached to the register. The factory seals them with a "potting compound".



**Do not open a potted encoder for any reason. This will void the manufacturer's warranty.**

Use the following installation procedure for sites equipped with potted RTR registers.

- 1 Route the cable from the potted register to the CWE mounting location. Splice in additional cable as necessary. When using additional cable, always match colors: black to black, red to red, green to green. All color translations will be done at the CWE mount.
- 2 Prepare cable ends for crimping:
  - a Using the cutting blade portion of the Wire Cutter and Stripper tool, cut the wire connecting the encoder register to the touchpad (or other device). The wire attached to the encoder register should contain at least three wires. If not, replace the encoder register with a 3-wire version.



**Figure 2.8 Wire cutter & stripper**

- b Using the #10 AWG position (second largest hole) on the 64-1919 wire stripper, remove 1 inch of the external insulation from the cable coming from the encoder register. Do not strip the insulation from the internal wires.



**Figure 2.9 64-1919 Wirestripper**



- c Peel back foil, if present. Cut excess foil and uninsulated wire.

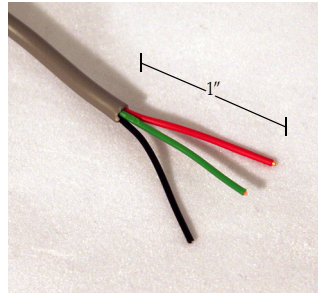


Figure 2.10 3-Wire cable



Do not damage the internal wire insulation when removing the external insulation.

- 3 Splice wires from CWE to Badger RTR. Match colors carefully according to the table below.

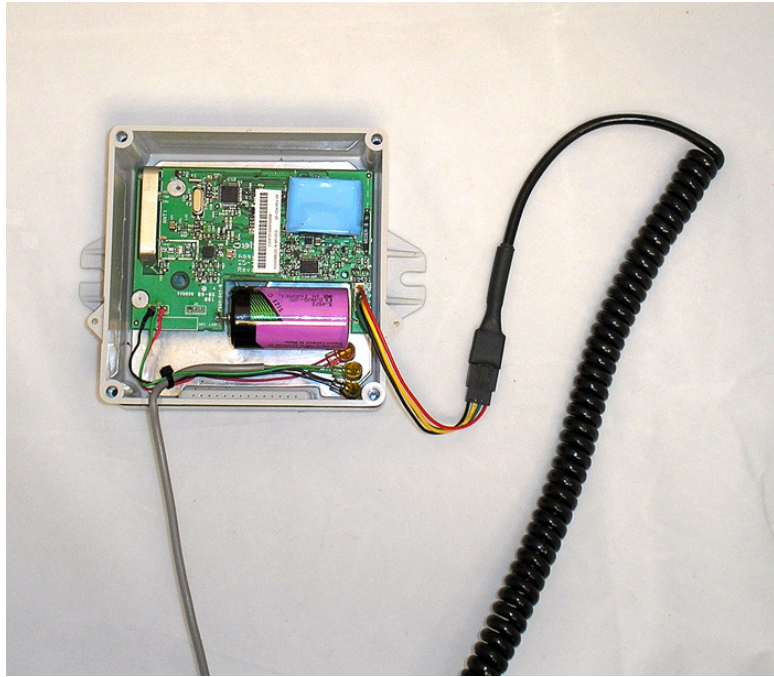
Table 3

Encoder Register	6060 Wire Color/Encoder Terminal
Badger RTR 3-Wire	<b>Blk/Blk Green/Red Red/Green</b> 
Badger RTR 2-Wire	<b>Blk/Blk Green/Red</b> 

- 4 See *Appendix A, Crimping Wires*, for instructions on crimping the wires.

### Programming CWE Remote endpoint for operation with a Badger RTR Register

You must program the CWE Remote endpoint with the HandHeld computer before it can operate with a Badger RTR register.



**Figure 2.11 MicroTex Fastreader connected to CWE Remote**

- 1 Connect the Cellnet Remote Water Programming Cable to the CWE Remote as shown above.
- 2 Follow the HandHeld computer prompts to program the endpoint.
- 3 Once the programming is complete, proceed to *Chapter 3, Testing the Endpoint*.

## PRO-READ ENCODER REGISTER

Before removing the ProRead receptacle, ensure that the ProRead register is programmed for three-wire mode.

- If a two-wire conductor cable is connected to a "potted" ProRead encoder register, replace the register with a three-wire register.

### Reprogramming a ProRead encoder from 2-wire to 3-wire

It may sometimes be necessary to reprogram a ProRead register encoder from 2-wire to 3-wire mode. Accomplish this with a Neptune ProRead field programmer.

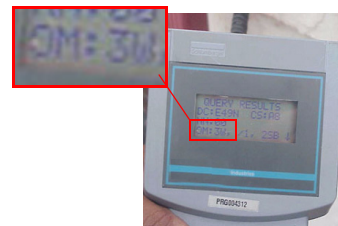
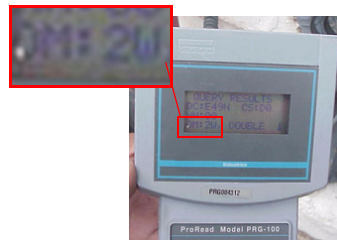
A basic overview of the steps is as follows:

- 1 Connect to the remote receptacle with the field programmer.
- 2 Interrogate the encoder register to determine its operating mode (2 or 3-wire).
- 3 Reconfigure the encoder register to make it operate in 3-wire model.
- 4 Verify that the reconfiguration was successful by looking at the Field Programmer screen. The OM field should be 3W (see below).

Table 2.1

**Before Reprogramming  
(2-wire mode)**

**After Reprogramming  
(3-wire mode)**



If the register has screw terminals, proceed to "Connecting a Neptune Auto or Sensus Encoder Register with Screw Terminals" on page 2-3.

If the register has potted leads, proceed to "Connecting a Badger, Neptune Auto or Sensus Encoder Register with Potted Leads" on page 2-6.

## CHAPTER 3 TESTING THE ENDPOINT

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After you have completed the installation process, test the installation by passing an RF Buster magnet near the endpoint's sensor. The CWE tests the connection to the register and transmits a pattern to indicate if the installation is good or bad. The RF Buster detects the transmission pattern, beeps and lights the LED.

- 1 Activate the CWE by passing the RF Buster magnet against the side of the CWE housing as shown.

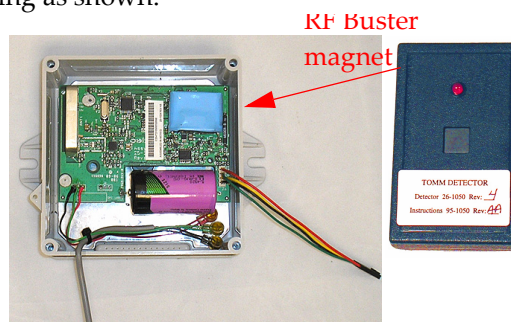


Figure 3.1 CWE Activation Using RF Buster



**Caution:** If you hold the RF Buster magnet near the side of the CWE for more than 2 seconds, it will not transmit the installation test pattern. If you do not hear beeps, hold the RF Buster away from the CWE for 15 seconds to allow it to reset to normal operating mode.

- 2 Press and hold the button on the RF Buster. Position the RF Buster less than 6 inches away from the front of the CWE. The RF Buster makes audible beeps and the LED flashes to confirm transmission of an RF packet from the endpoint.



**Do not use a cell phone or any other RF device while conducting this test.**

- 3 If the RF Buster detects 6-10 packets within 1 minute, the installation is good and the endpoint has been activated properly. If the RF Buster detects 3 or fewer packets, it indicates a bad connection between the endpoint and the register, a bad register, a bad endpoint, or an incorrect configuration. If the problem persists, refer to *Troubleshooting*.
- 4 Attach the cover using the four screws included in the hardware kit.
- 5 Clean the area and remove all disposable materials.



## CHAPTER 4 ENDPOINT REPLACEMENT

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Use the HandHeld and Cellnet Remote Water Endpoint Programming Cable to deactivate all CWEs prior to leaving the worksite. The handheld prompts you to deactivate while processing the work order.

- 1 Open the face of the CWE Remote.
- 2 Write down the color translation.
- 3 Carefully cut any tie wraps.
- 4 Cut off Scotchlocks near the crimp.
- 5 Unmount the CWE Remote.

Proceed to *"Identifying the Register for Installation"* on page 2-1.



## CHAPTER 5 TROUBLESHOOTING

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### What if the register is not compatible with the CWE?

Verify that the register is one of the following:

- Badger ADE
- Badger RTR
- Neptune ProRead (ARB VI)
- Sensus ECR-II
- Sensus ECR-III

If the register is not one of the models listed above, replace with a supported register type and/or the appropriate meter.

### What if the RF Buster does not beep when testing the installation?

Does the RF Buster beep and light the LED when the switch is initially pressed? If not, the battery in the RF Buster is dead. Replace the RF Buster battery, or use another RF Buster.

Be careful not to hold the RF Buster magnet near the CWE magnet sensor on the right of the enclosure for more than 1 second.

After activating the magnetic switch on the CWE, hold the RF Buster switch on continuously. Point the LED end of the RF Buster toward the front of the CWE. Hold the RF Buster between 6" and 12" from the front of the CWE. Wait 10 seconds. If the RF Buster does not beep, replace the CWE.

### What if the RF Buster does not beep more than 6 times when testing the installation?

For Neptune registers, if the register is labeled "Pro", double-check that it is configured for 3-wire mode as instructed on *"Reprogramming a ProRead encoder from 2-wire to 3-wire"* on page 2-12. Re-check the manufacturer and model of the register that you are installing. Make sure you have used the correct color code for that register.

Check the wire between the CWE and the register for cuts, nicks, or broken wires. Repair or replace the cable if necessary.

If you are using a Pro-read encoder, make sure it is programmed for 3-wire mode.

If you are using a Badger RTR, double-check the programming of the CWE.

If the CWE still does not transmit more than 6 times, replace it.



**How can I tell the difference between a Sensus ECR-I and ECR-II encoder register?**

The easiest way to determine the difference between ECRI and ECRII is physical appearance. ECRI is a “high top” design with odometer wheels behind a a flange. If you still cannot determine which encoder register it is, please contact your local Sensus Meter Representative.

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**CUSTOMER SUPPORT**

To reach Customer Support at Cellnet:

Email: [customersupport@cellnet.com](mailto:customersupport@cellnet.com)

Telephone: 1-800-791-2567.

Hours of operation - 8:00 a.m. ET to 5:00 p.m. ET

## APPENDIX A CRIMPING WIRES

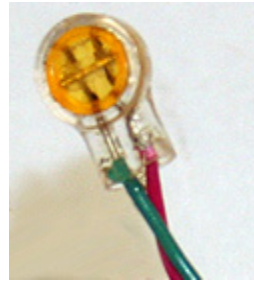
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Use this process to crimp wires for the Cellnet Water Endpoint.

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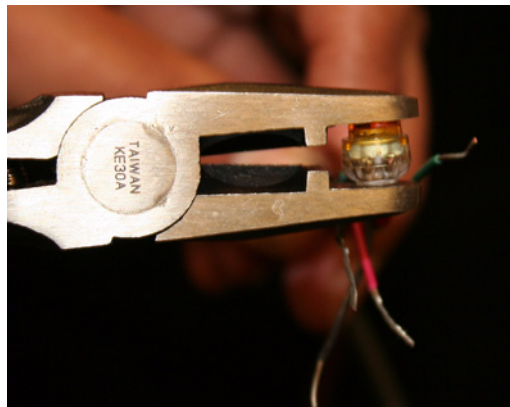
### CRIMPING WIRES

- 1 Push the wires to be connected as far as possible into the Scotchlok connector.



**Figure A.1 Wires pushed into Scotchlok connector**

- 2 Place the Scotchlok connector (with wires) into the jaws of the crimping tool.

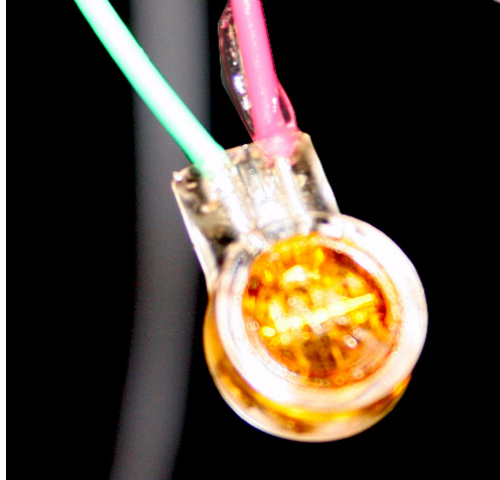


**Figure A.2 ScotchLok connector in crimping tool jaws**



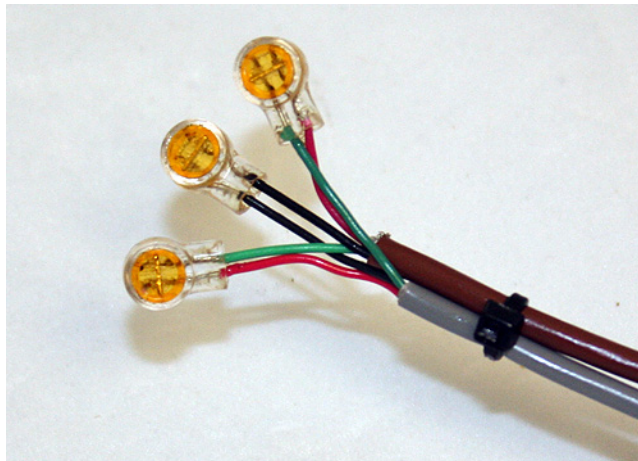
Always use 3M Parallel Jaw Crimping Tool 3M Model E-9Y or equivalent.

- 3 Crimp the Scotchlok connector by squeezing the handles until it discharges gel. Continue to apply pressure for three seconds.



**Figure A.3 Crimped Scotchloks discharge gel**

- 4 Place two plastic cable ties on wires and tighten securely for strain relief. Remove excess cable tie with wire cutters.



**Figure A.4 Placing plastic ties on cables**

- 5 For splice connections outside the CWE Remote enclosure, insert the entire splice assembly into the silicone-filled splice enclosure. Close the cover with leads exiting alternate sides

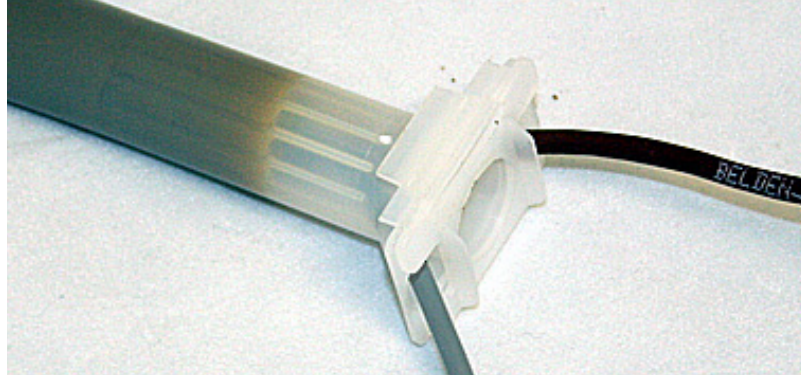


Figure A.5 Inserting splice assembly into silicone-filled splice enclosure



**Cellnet strongly recommends a splice enclosure, particularly for Badger RTR installations. Failure to use a splice enclosure may invalidate the manufacturer's warranty.**



The 3M Gel splice connector is NOT reusable. Replace the splice if necessary.



## GLOSSARY

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<b>ADE</b>	Absolute Digital Encoder
<b>Concentrator</b>	Collects all information provided by the Cellnet endpoints.
<b>CWE</b>	Cellnet Water Endpoint
<b>CWE 6010/6020 Pit</b>	Cellnet manufactured water endpoint (CWE) - available for pit installations
<b>CWE 6060 Remote</b>	Cellnet manufactured water endpoint (CWE) - available for remote, above-ground installation
<b>MIU</b>	Meter Interface Unit
<b>Pit</b>	Cement/metal box containing water meter
<b>Potted terminal</b>	Terminal with integrated, water submersible, reusable connector
<b>PowerLAN</b>	Unique network address of endpoints
<b>Register</b>	Device used for registering water usage. This can be an Encoder or a Pulse-counting device
<b>RF</b>	Radio Frequency
<b>RF Buster</b>	Device used to verify RF transmission from endpoint
<b>RTR</b>	Recordall Transmitter Register
<b>Screw terminal</b>	Terminal with stripped and retained leads

*Notes:*

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