

Smart Sensors

OutageAdvisor Variable Trip Current Reset Faulted Circuit Indicator Commissioning and Installation Instructions

Service Information

S320-92-1

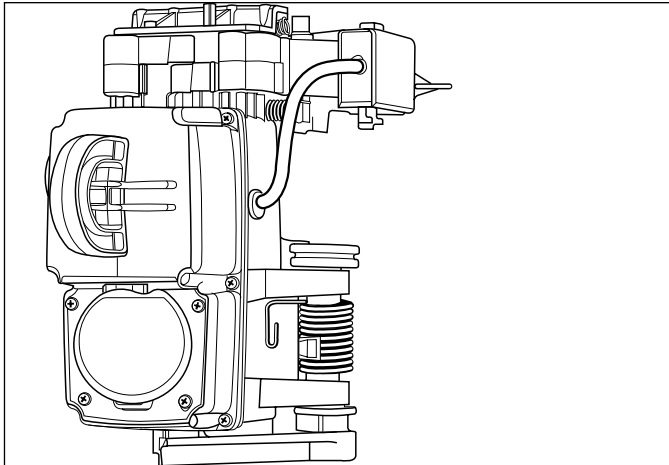


Figure 1.
OutageAdvisor Variable Trip CR faulted circuit indicator.

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PRODUCT INFORMATION

Introduction

The Cooper Power Systems OutageAdvisor Variable Trip Current Reset (CR) faulted circuit indicator (FCI) is cable-mounted and indicates the passage of fault current by showing a “fault” flag in the window of the display. The OutageAdvisor Variable Trip CR faulted circuit indicator consists of an integral clamp-on sensing unit with a patented clamping mechanism that allows one unit to be used on cable sizes from 0.25” to 2.0”. The FCI uses a variable-trip design, which senses load current and trips based on a rise in current followed by a loss of current. A minimum of 350 A (load current plus fault current) is required to trip the device. When 10.0 A of load current returns to the cable, the FCI will automatically reset. The flag will not change

⚠ WARNING:

The Cooper Power Systems OutageAdvisor Variable Trip Current Reset faulted circuit indicator is designed to be operated in accordance with normal safe operating procedures. These instructions are not intended to supersede or replace existing safety and operating procedures. Read all instructions before installing the faulted circuit indicator.

Faulted circuit indicators should be installed and serviced only by personnel familiar with good safety practice and the handling of high-voltage electrical equipment.

Improper operation, handling, or maintenance can result in death, severe personal injury, and equipment damage.

position as a result of mechanical shock or vibration. The FCI is weatherproof, submersible, and meets or exceeds IEEE Std 495™-1986 standard “Guide for Testing Faulted Circuit Indicators.”

Read This Manual First

Read and understand the contents of this manual and follow all locally approved procedures and safety practices before installing or operating this equipment.

Additional Information

These instructions cannot cover all details or variations in the equipment, procedures, or processes described nor provide directions for meeting every possible contingency during installation, operation, or maintenance. For additional information, contact your representative.

Acceptance and Initial Inspection

Each sensor is in good condition when accepted by the carrier for shipment. Upon receipt, inspect the shipping container for signs of damage. Unpack the sensor and inspect it thoroughly for damage incurred during shipment. If damage is discovered, file a claim with the carrier immediately.

Handling and Storage

Be careful during handling and storage of the sensor to minimize the possibility of damage. If the sensor is to be stored for any length of time prior to installation, provide a clean, dry storage area.

Standards

ISO 9001:2000-Certified Quality Management System



SAFETY FOR LIFE



Cooper Power Systems products meet or exceed all applicable industry standards relating to product safety. We actively promote safe practices in the use and maintenance of our products through our service literature, instructional training programs, and the continuous efforts of all Cooper Power Systems employees involved in product design, manufacture, marketing, and service.

We strongly urge that you always follow all locally approved safety procedures and safety instructions when working around high voltage lines and equipment and support our “Safety For Life” mission.

SAFETY INFORMATION

The instructions in this manual are not intended as a substitute for proper training or adequate experience in the safe operation of the equipment described. Only competent technicians, who are familiar with this equipment should install, operate, and service it.


A competent technician has these qualifications:


- *Is thoroughly familiar with these instructions.*
- *Is trained in industry-accepted high- and low-voltage safe operating practices and procedures.*
- *Is trained and authorized to energize, de-energize, clear, and ground power distribution equipment.*
- *Is trained in the care and use of protective equipment such as flash clothing, safety glasses, face shield, hard hat, rubber gloves, hotstick, etc.*


Following is important safety information. For safe installation and operation of this equipment, be sure to read and understand all cautions and warnings.

Hazard Statement Definitions

This manual may contain four types of hazard statements:

 **DANGER:** Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

 **WARNING:** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

 **CAUTION:** Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION: Indicates a potentially hazardous situation which, if not avoided, may result in equipment damage only.

Safety Instructions

Following are general caution and warning statements that apply to this equipment. Additional statements, related to specific tasks and procedures, are located throughout the manual.

DANGER:

Hazardous voltage. Contact with hazardous voltage will cause death or severe personal injury. Follow all locally approved safety procedures when working around high- and low-voltage lines and equipment.

WARNING:

Before installing, operating, maintaining, or testing this equipment, carefully read and understand the contents of this manual. Improper operation, handling, or maintenance can result in death, severe personal injury, and equipment damage.

WARNING:

This equipment is not intended to protect human life. Follow all locally approved procedures and safety practices when installing or operating this equipment. Failure to comply may result in death, severe personal injury, and equipment damage.

WARNING:

Power distribution and transmission equipment must be properly selected for the intended application. It must be installed and serviced by competent personnel who have been trained and understand proper safety procedures. These instructions are written for such personnel and are not a substitute for adequate training and experience in safety procedures. Failure to properly select, install, or maintain power distribution and transmission equipment can result in death, severe personal injury, and equipment damage.

INSTALLATION PROCEDURES

Underground Distribution Circuits

PRIMARY CABLE PREPARATION

Proper primary cable preparation is necessary for the OutageAdvisor Variable Trip CR faulted circuit indicator to work reliably on underground distribution circuits. The FCI can be used on concentric neutral, tape shield or drain wire cable. If the cable does not provide a return path for the fault current, the FCI can be installed directly over the cable. If used on concentric neutral cable, or if the cable shield provides a return path for the fault current, the FCI will not reliably detect a fault and will require the use of a tape shield or drain wire adapter. When used, the adapter must be installed approximately 3.5" below the elbow to allow space for mounting the FCI on the cable.

One of the following four methods is preferred for installation on concentric neutral primary cable.

Method 1 (Refer to Figure 2-a)

1. Attach one or two strands of the concentric neutral wrapped around the cable to the tie-off tab on the elbow.
2. Terminate all of the remaining neutral wires approximately 6" below the elbow.
3. Pull the neutral wires straight up and terminate them again just below the elbow. The wires should then be bent back down the cable which is commonly referred to as "double back".

4. Terminate the ground wires approximately 6" below the elbow.

NOTE: The FCI is installed over the "double back" neutral wires to cancel the effect of current in the neutral. The exact trip value is dependent on the overall diameter of the "double back" neutral wires.

Method 2 (Refer to Figure 2-b)

1. Attach one or two strands of the concentric neutral wrapped around the cable to the tie-off tab on the elbow.
2. Terminate all of the remaining neutral wires just below the elbow. The balance of the neutral wires should be gathered together and "double backed" down the cable and grounded.

NOTE: The FCI is installed over the "double back" neutral wires to cancel the effect of current in the neutral. The exact trip value is dependent on the overall diameter of the "double back" neutral wires.

Method 3 (Refer to Figure 2-c)

1. Attach one or two strands of the concentric neutral wrapped around the cable to the tie-off tab on the elbow.
2. Terminate and ground all of the remaining neutral wires approximately 6" below the elbow.

Method 4 (Refer to Figure 2-d)

1. Arch one or two strands of the concentric neutral wrapped around the cable and attach it to the tie-off tab on the elbow. The arch should be large enough to go around the outside FCI when the FCI is installed.

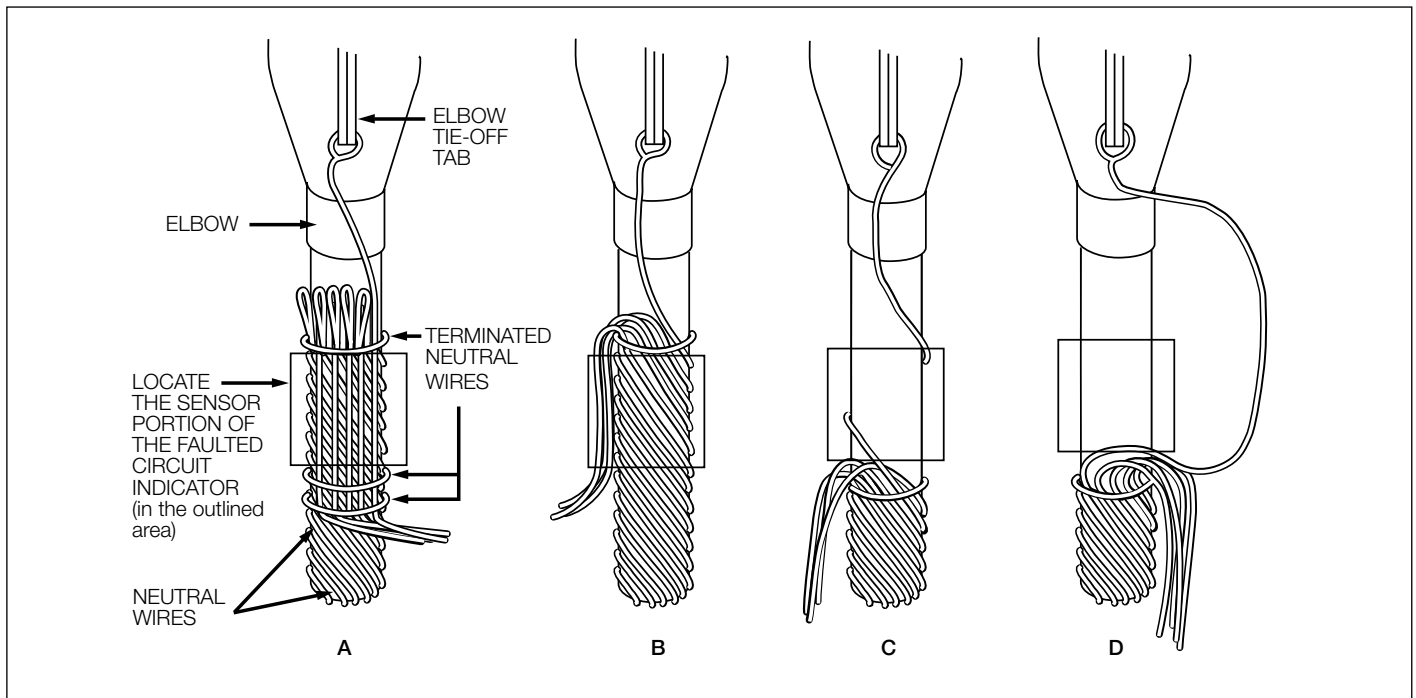


Figure 2. Recommended methods of concentric neutral primary cable preparation.

Some installations of improper preparation of the primary cable will result in an inoperable FCI (see Figure 3a and 3b). The magnetic field, due to current in the center conductor, will be cancelled by the current in the concentric neutral wires. **DO NOT PLACE THE FAULT INDICATOR AS SHOWN IN FIGURE 3! DOING SO WILL PREVENT THE FCI FROM WORKING PROPERLY.**

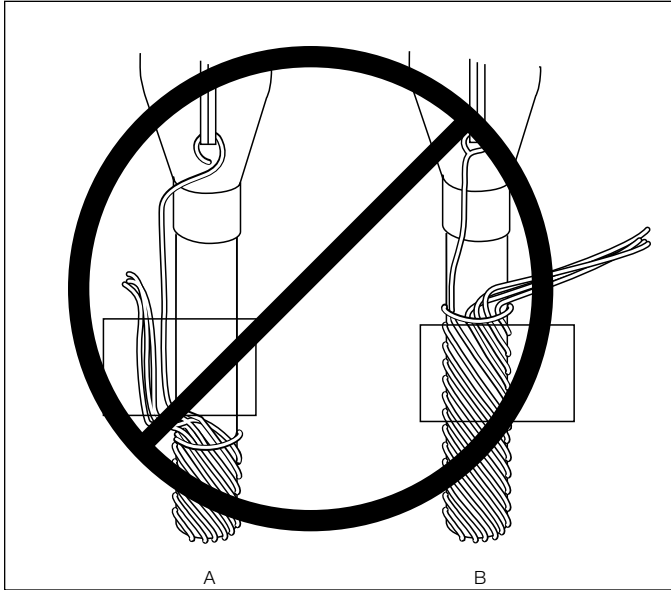


Figure 3.
Incorrect methods of concentric neutral primary cable preparation.

INSTALLATION OF THE FCI

1. Arm the FCI clamping mechanism by carefully grasping both clamping arms, pulling them apart until the trigger mechanism drops into place. Stops have been built into the clamping arms such that they can only be opened to the point where the trigger will latch (See Figure 4).
2. For applications where the cable diameter is less than 1", leave the clamp pads attached to the clamp arms. On installations where the cable diameter exceeds 1", remove the pads that are attached to each clamping arm. Removing the pads will allow the clamping mechanism to properly attach to larger diameter cables. (See Figure 6.)
3. Attach the fault indicator to a shotgun clamp stick using the FCI pulling eye.
- 4a. Push the fault indicator onto the cable below the elbow at a location shown in Figure 2 while holding the shotgun stick horizontal. The triggering mechanism will release the clamping arms and securely attach the device to the cable. Note that only the closed core CT need be applied over the region of the cable where the concentric neutral has been removed or double-backed (see Figure 4).

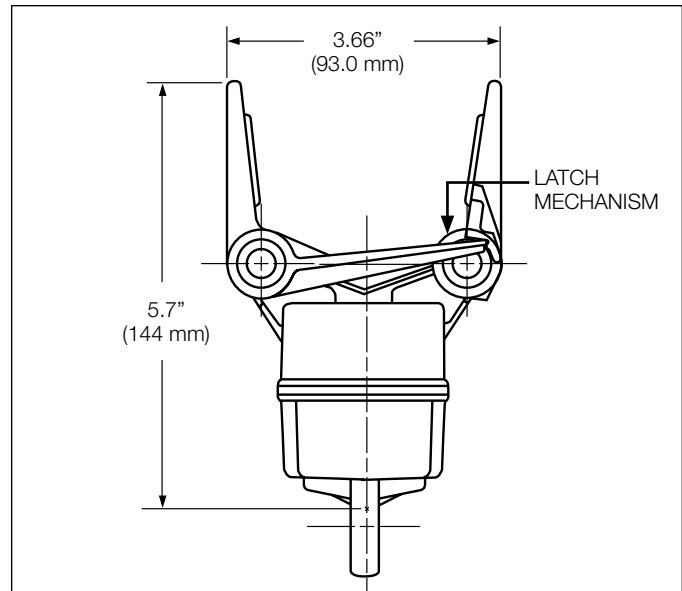


Figure 4.
Faulted circuit indicator clamping arms in the latched position.

- 4b. For installation on tape shield cable, the closed-core CT of the FCI should be placed above the location on the cable where the tape shield has been removed or trained back as part of the cable termination. Location of the FCI must be similar to Figure 2 (C or D), or Figure 5 (A or B), for proper operation of the FCI.

5. Remove the shotgun stick.

NOTE: On 200 A loadbreak elbows, the preferred installation is demonstrated in Figure 5A, where the closed core CT is located directly below the test point.

Overhead Distribution Circuits

1. Arm the FCI clamping mechanism by carefully grasping both clamping arms, pulling them apart until the trigger mechanism drops into place. Stops have been built into the clamping arms such that they can only be opened to the point where the trigger will latch (See Figure 4).
2. For applications where the cable diameter is less than 1", leave the clamp pads attached to the clamp arms. On installations where the cable diameter exceeds 1", remove the pads that are attached to each clamping arm. Removing the pads will allow the clamping mechanism to properly attach to larger diameter cables (See Figure 5).
3. Apply a thin layer of silicon lubricant to the inside of the closer core current transformer (CT).
4. Attach the fault indicator to a shotgun (clamp) stick using the FCI pulling eye.
5. Push the fault indicator onto the cable conductor. Ensure that the CT is around the conductor and good contact is made between the ends of the CT. The triggering mechanism will release the clamping arms from the latched position, to securely attach the device to the cable.

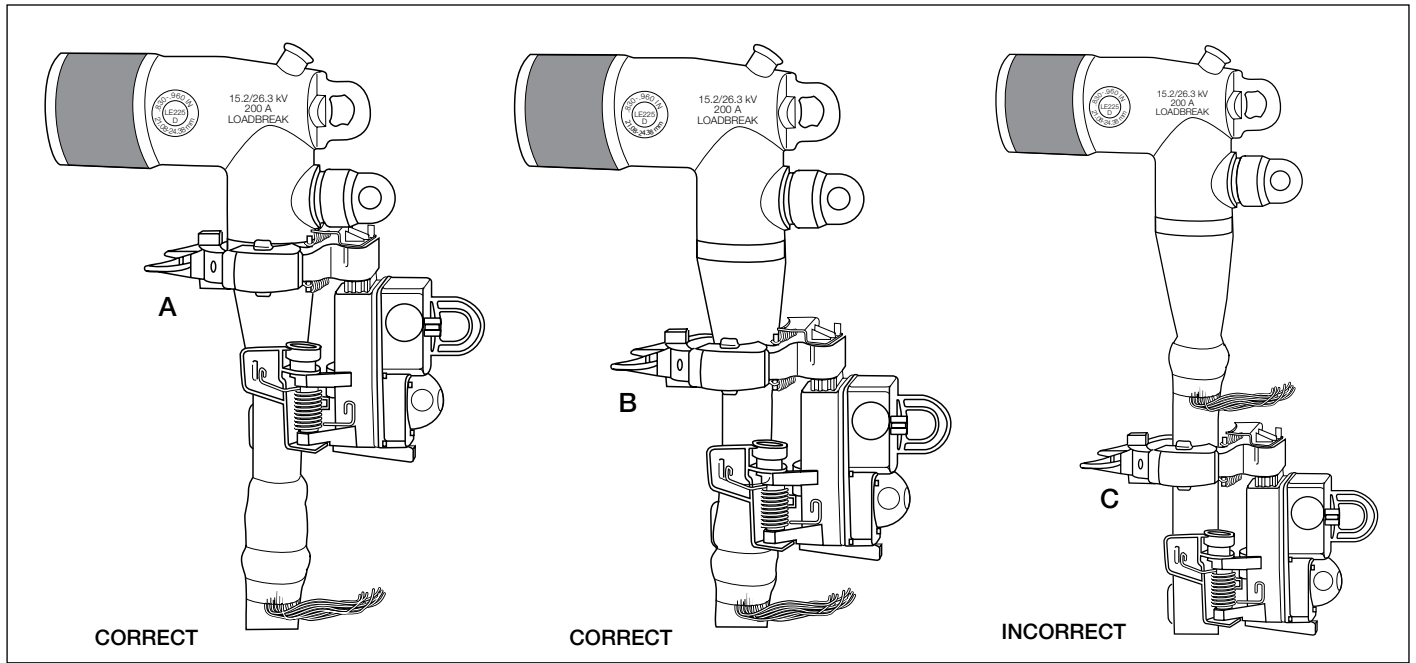


Figure 5.
 Proper installation of Variable Trip CR FCI on prepared conductor is shown in Figures A and B. Figure C shows the incorrect placement for installation.

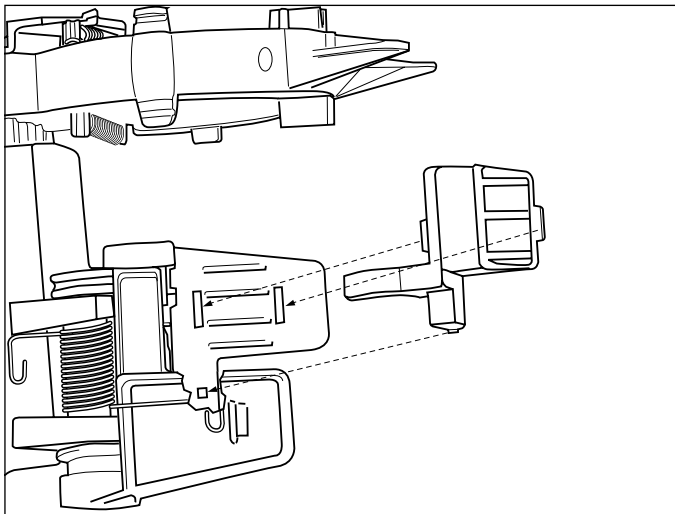


Figure 6.
 Remove clamp pads attached to each clamping arm on a mechanism where cable diameter exceeds 1".

Fisheye Display Operation

Each OutageAdvisor sensor is shipped in the orange (faulted) position.

Cellular Device:

A minimum of 10-Amps of continuous load current is required for the device to function properly.

NOTE: If the load current dips below 10-Amps at any point, the device will report a loss of power and the unit will shut down, conserving power. Once the 10-Amp minimum load current returns, the device will report a restoration of power message and continue to monitor normally. If this happens repeatedly, we recommend relocating that device to a location with a higher amount of continuous load current.

Install device a minimum of 10-feet from structure on conductor.

Upon installation the following will occur:

1. The Fisheye display will quickly flip to black and then back to orange if adequate load current is present (10-amps continuous).

NOTE: If the Fisheye display is already in the black position, it will flip to orange to black and back to orange. This will be the scenario if a previously installed device is relocated.

If the Fisheye display does not flip, this is an indication there is not adequate load current present to operate the device. In this instance, the device should be relocated to a location more suitable. The unit will then attempt to establish network communications.

2. The device attempts network connection for approximately 15 minutes. Once communications are established the Fisheye display will flip to the black (reset) position. The sensor is now in service and the communication link has been established. An initial data packet has been sent to the Yukon server.
3. If communications cannot be established, the Fisheye display will flip back and forth approximately 10 times stopping in the orange (tripped position). It will stay in this position until the next health message is sent (18 hours) or if there is a qualifying event. After that it will automatically reset and the Fisheye display will flip to the black (reset) position. It will now function as a standard (non-communicating) SCVT faulted circuit indicator. However, each time the device sees a qualifying event (momentary or sustained fault) it will re-attempt to communicate to the cellular network and report that event. If communications still cannot be established the device will indicate a fault via the mechanical Fisheye display only (orange, tripped position). The non-communication SCVT does not indicate a momentary fault.

If at any time during the installation process, the Fisheye display flips back and forth repeatedly, the device has suffered a significant error and cannot be installed.

Troubleshooting Guide:

- **Symptom:** The Fisheye display does not flip upon installation.

Solutions:

- » Verify that the minimum 10-Amps of load current is present
- » Verify that the device CT is completely closed.

- **Symptom:** The communication link cannot be established.

Solutions:

- » Relocate the device 10-15 feet from it's present location
- » Verify that the common potential spring connects the CT Spring Assembly to the base connection of the lug located on the side of the device.

- **Symptom:** The Fisheye display flips back and forth numerous times right after installation.

Solution:

- » Move the device further from the structure; most likely something on the structure is causing noise to interfere with the device communication.

If you lose track of what the Fisheye display has done, you can remove it from the conductor for approximately 2 minutes. This will force a "loss-of-power" transmission. The unit should transmit a loss of power and then a restoration of power upon re-installation. The Fisheye display will remain in the black (reset) position the entire time.

Removing the FCI

1. **Insert the hook end from the shotgun stick into the pulling eye of the FCI and lock the shotgun stick tight against the FCI body.**
2. **Pull straight back on the hotstick, making sure that the center of the cable is centered on the parting line of the current transformer.** This will assist the CT in opening, allowing the cable to exit.
3. **If clamp pads must be used with the FCI upon re-installation,** ensure that the pads are properly attached to the clamp arms.



APPENDIX A: REGULATORY INFORMATION:

COMPLIANCE INFORMATION:

Federal Communications Commission (FCC):

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 and 24 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.
- Connect the equipment into an outlet or circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

WARNING: Changes or modifications to this device not expressly approved by Cooper Power Systems could void the user's authority to operate this equipment.

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.

Radio Frequency (RF) Exposure:

In accordance with FCC requirements of human exposure to radiofrequency fields, the radiating element shall be installed such that a minimum separation distance of 20cm is maintained.

Important Battery Information

- Do not disassemble or open crush, bend or deform, puncture or shred
- Do not modify or remanufacture, attempt to insert foreign objects into the battery, immerse or expose to water or other liquids, expose to fire, explosion or other hazard.
- Only use the battery for the system for which it is specified
- Only use the battery with a charging system that has been qualified with the system per this standard. Use of an unqualified battery or charger may present a risk of fire, explosion, leakage, or other hazard.
- Do not short circuit a battery or allow metallic conductive objects to contact battery terminals.
- Replace the battery only with another battery that has been qualified with the system per this standard, IEEE Std 1725™-2006 standard. Use of an unqualified battery may present a risk of fire, explosion, leakage or other hazard.
- Promptly dispose of used batteries in accordance with local regulations
- Battery usage by children should be supervised.
- Avoid dropping the phone or battery. If the phone or battery is dropped, especially on a hard surface, and the user suspects damage, take it to a service center for inspection.
- Improper battery use may result in a fire, explosion or other hazard.

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