R160 Air Pressure Tag

RF Code™
discover. track. monitor.

Installation Guide

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Contents

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FCC Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

RF Code is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

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.

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Industry Canada Compliance Statement
This Class A digital apparatus meets the requirements of the Canadian Interference-Causing Equipment Regulations.

Avis de conformité à la réglementation d'Industrie Canada
Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

The system is designed to operate with RF Code RFID Tags – whose operating frequency is 433.92 MHz which have been certified or are in the certification process. These devices comply with part 15 of the FCC rules. Operation is subject to the following two conditions:
(1) these devices may not cause harmful interference, and
(2) these devices must accept any interference received, including interference that may cause undesired operation.
    a. FCC ID: P6F2005433 for beacon intervals greater than, or equal to 10 seconds.
    b. FCC ID: P6F433MHZ for the security tag with beacon intervals less than 10 seconds.

CE Compliance

This is a Class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures. This equipment complies with the requirements relating to electromagnetic compatibility, EN 55022 class A, the essential protection requirement of Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility.

WEEE Compliance

Do Not Dispose Product with Municipal Waste. Special Collection/Disposal Required.

Battery Statement

RF Code warrants all tags to be free from defects in materials and workmanship for a period of 1 year.

Based on the ratings and specifications from the battery manufacturers, RF Code develops usage models to calculate the life of the active RFID Tags. Like all models there are assumptions and approximations involved. The values are to be taken as engineering estimates - not guaranteed performance.

In most asset tag deployment scenarios, RF Code tags with a 10-second beacon rate have a useful life of 5-to-7 years.

In most sensor tag deployment scenarios, RF Code tags will typically have a useful life of 3 or more years.

Exposure to extreme temperatures for all tags will shorten the battery life.

Introduction

RF Code's R160 Differential Air Pressure Sensor monitors and reports the differential air pressure reading between two points (e.g., above vs. below a raised floor or room vs. plenum). While the pressure ranges found in the data center can exceed 0-0.5" H2O/0-125 Pa, the pressure differentials found in the plenum are often only 0.01" H2O/2.5 Pa, requiring a sensor to be both accurate and precise in order to assure proper monitoring. Periodically reporting its unique ID along with the sensor data observed by the tag, the R160 is designed for use in combination with an RF Code fixed reader infrastructure and the RF Code software stack (Zone Manager, Sensor Manager or Asset Manager) as part of the RF Code Environmental Monitoring solution.

The R160 sensor is housed in an ABS plastic enclosure that can be mounted with strong adhesive on the back of the case, or via hardware/screws or zip-ties through the mounting holes. The unit ships with 8 feet of flexible tubing to achieve physical separation between the +/- sensor terminals. The R160's form factor ensures clear signal transmission in high-density deployments.

RF Code's Environmental Monitoring solution line is made up of:

- R120 Door Tag
- R130 Dry Contact Tag
- R135 Fluid Detector Tag
- R150 Rack Temperature Tag
- R155 Humidity-Temperature Tag
- **R160 Air Pressure Tag**
- R170 PDU Family of Tags
- Sensor Manager Software

Features

Some of the features of the R160 Air Pressure Tag are:

- Provides Wireless Differential Pressure Data Between Two Points
- Ideal for Optimizing Data Center Air Flow and Cooling Systems
- Fully Compatible with RF Code's Sensor Manager and Asset Manager Software Solutions
- Easy-to-Deploy, "Wire-free" Monitoring
- Sensor Tag Easily Mounts to Flat Surfaces and Walls
- Plenum-rated Tubing Can Be Routed Above /Below Floors, along Walls, or in Air Ducts
- Low Power Consumption for Long Battery Life

Contents

The R160 Air Pressure Tag package contents are:

- R160 Air Pressure Tag
- 8 ft. of tubing
- Adhesive pads
- Zip-tie Kit
- Printed R160 Installation Guide

Installation Steps

1. Mount R160 Air Pressure tag using provided adhesive pads or by securing with screws or zip-ties (not provided).

2. Attach the plenum pressure tube to the **Plenum Pressure Tube Port** indicated by a + symbol on the tag (or the "top" tube port).

Figure 1: Plenum Tube Port Indication

3. Extend tubing inside the plenum space.

4. Secure end of tubing using provided zip-ties so that air-flow doesn't cause movement of the tubing which can cause inconsistent sensor readings.

Once the R160 Air Pressure Tag has been properly installed, it can be configured within RF Code's Sensor Manager where graphs can be utilized to analyze air pressure trends as in the examples shown below. For information regarding configuration of Sensor Manager, please refer to the **Sensor Manager Administrator Manual and User Manual** available at:

http://www.rfcode.com/Resources/Library/User-Manuals.html

Figure 2: Differential Graph over A Seven Day Period

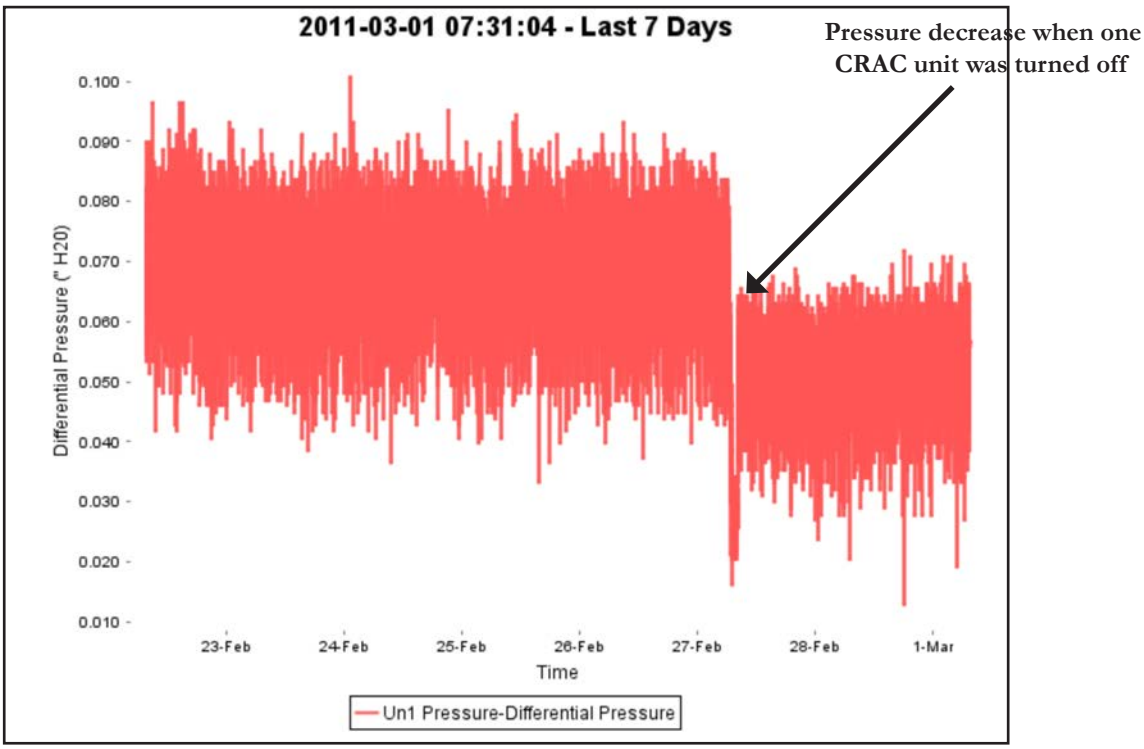
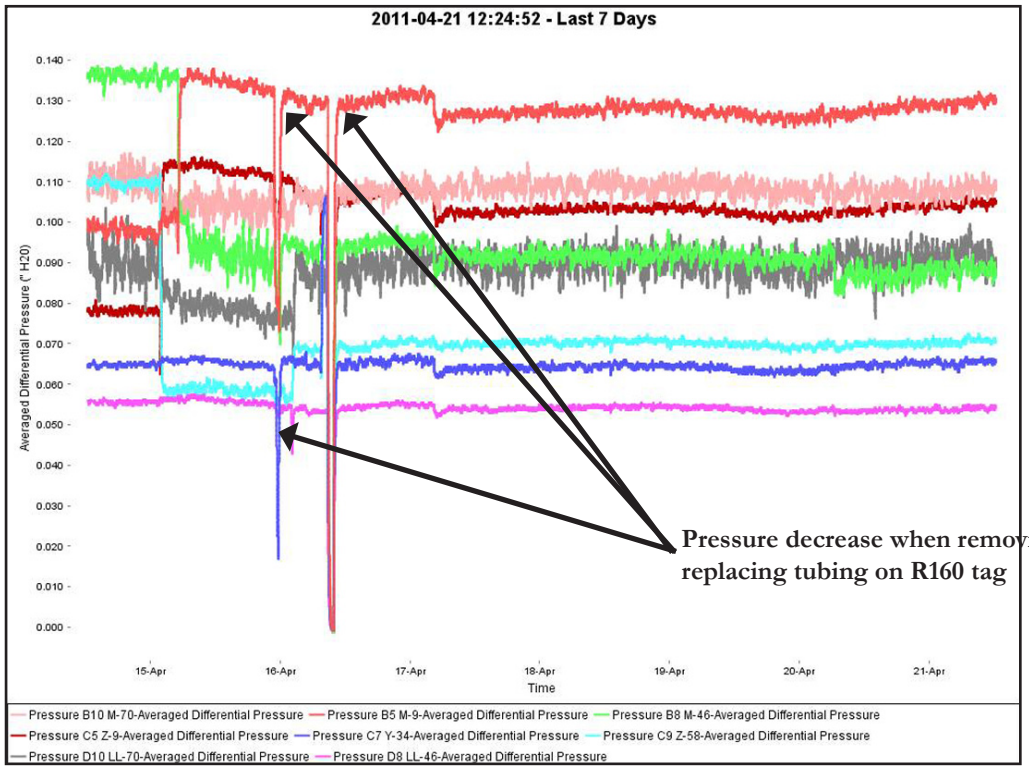


Figure 3: Average Differential Graph over A Seven Day Period



Recommended Best Practices

Note

RF Code recommends deploying one R160 Air Pressure Tag for every 500 square feet of data center floor space for optimal coverage.

For minimum coverage, RF Code recommends one R160 Air Pressure Tag for every 1000 square feet of data center floor space.

Each data center is unique and will have different air pressure and air flow characteristics, so there is not a standard "baseline" air pressure reading to target. It is recommended that differential air pressure trends be gathered over a period of time to establish a baseline. Then, changes to cooling system parameters can be made and subsequent changes to differential air pressure trends can be analyzed to determine optimal cooling system performance.

When deploying sensors, it is recommended not to install them too close to CRAC (Computer Room Air Conditioning) units. Field deployments have shown that sensors deployed within a few feet of a CRAC may exhibit inconsistent or variable readings due to unstable air movement patterns near the CRAC.

The R160 Air Pressure Tag should be mounted a few feet above the floor to enable the best possible read range.

Please note that once the tubing is attached to either (or both) of the nozzles of the R160 Air Pressure Tag, it is extremely difficult to remove. To properly remove the tubing from the nozzle carefully use a small knife or sharp cutting tool to split the tubing where it is connected to the nozzle allowing it to be easily pulled away. Trim the end of the tubing where the cut was made to allow for proper reinstallation later.

Battery Replacement Instructions

1. Using a small philips head screw driver, remove the four screws from the top of the tag case and set them aside..

Figure 4: Remove screws from R160 Tag Case

2. Remove tag case cover and set aside.

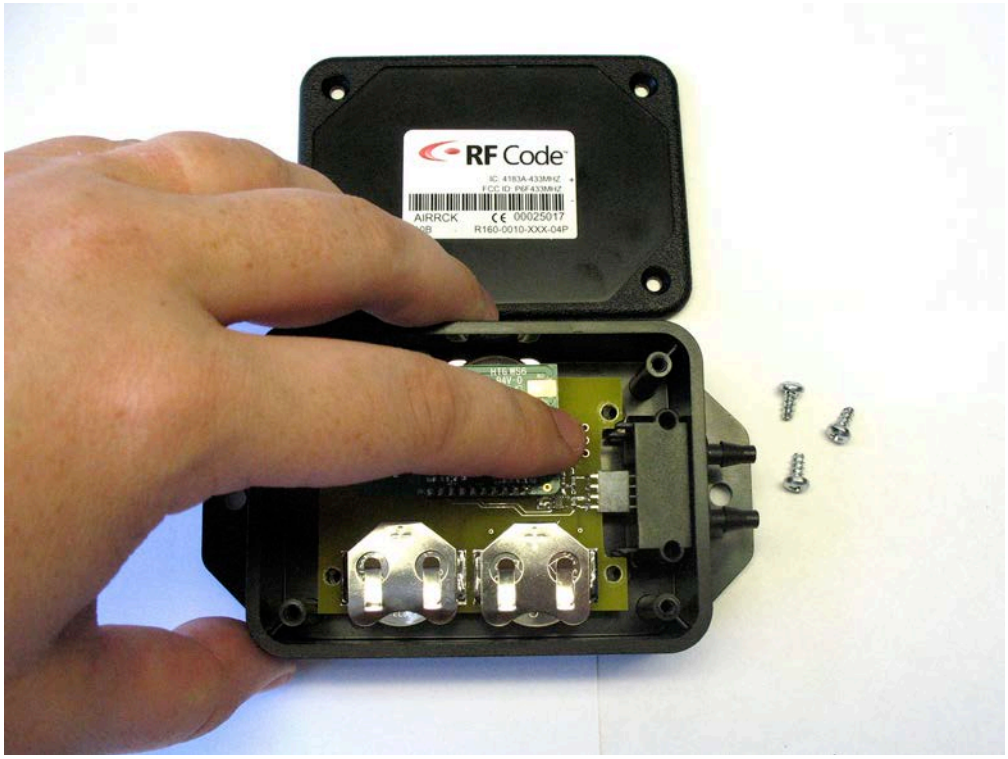
Figure 5: Remove tag case cover

3. Remove the three small screws that are holding the tag circuit board in place and set aside.

Figure 6: Remove screws holding tag board in place

4. Slide the tag board to left to unattach it from the sensor.

Figure 7: Slide the tag circuit board to the left

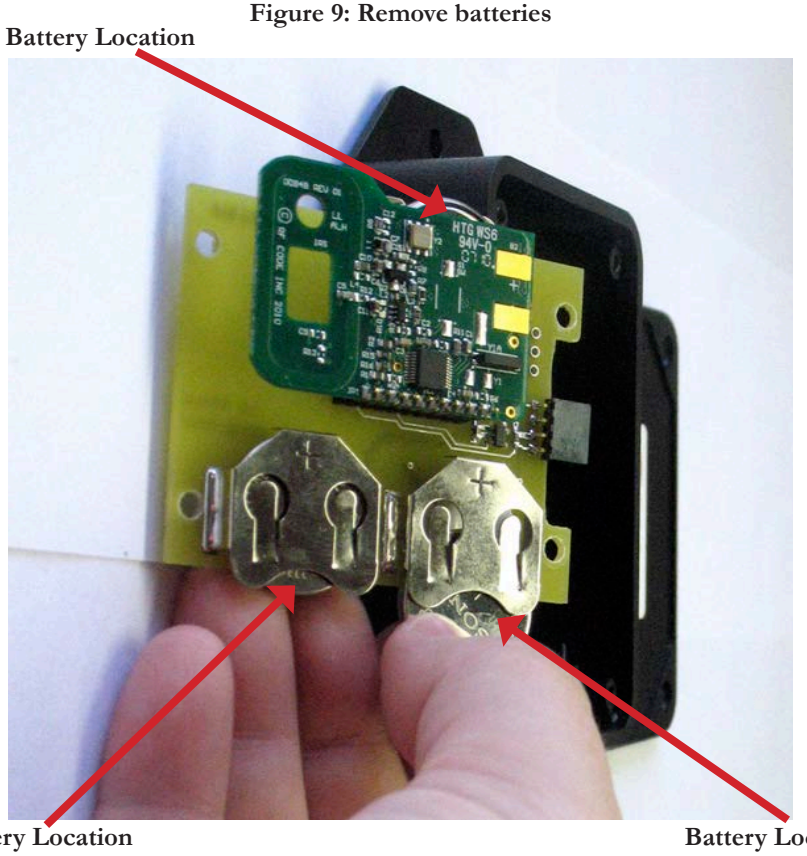


5. Remove the board from the tag case (board will need to be tilted at a slight angle to remove it from the tag case).

Figure 8: Remove tag board from the case

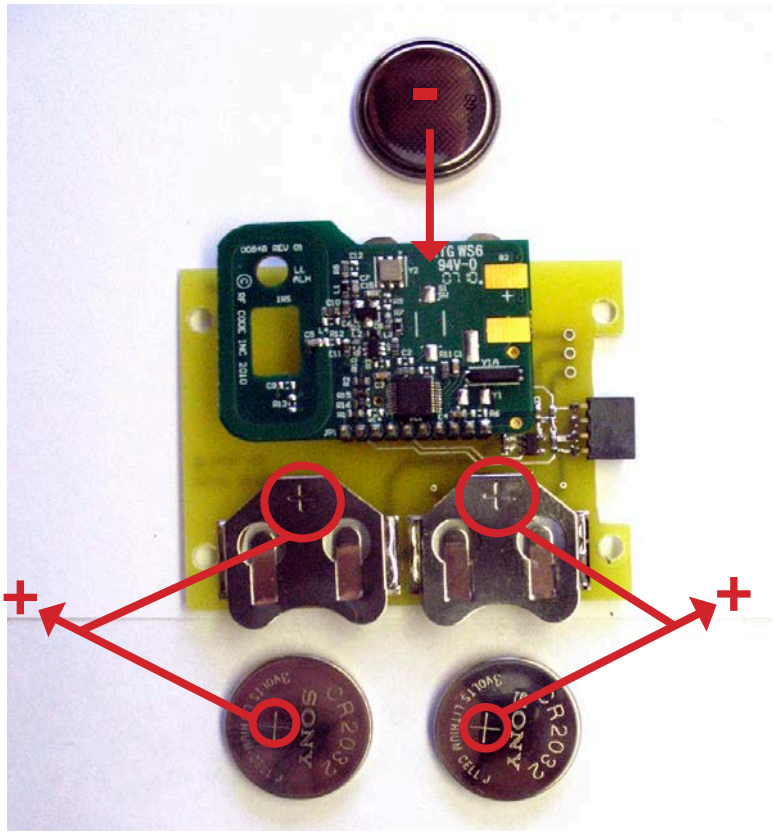
6. Remove each of the three batteries from the battery holders.

Figure 9: Remove batteries



7. Replace batteries with fresh **CR2032** batteries ensuring that polarity matches for battery contacts.

Figure 10: Replace batteries



8. Insert the tag board with replacement batteries back into the tag case and slide to the right to push the board back into connection with sensor. Please pay very close attention that you are lining the tag board up properly with the sensor connector pins. Slide the board until the tag circuit board screw hole cutouts align with the tag screw holes.

Figure 11: Insert tag board and connect with sensor

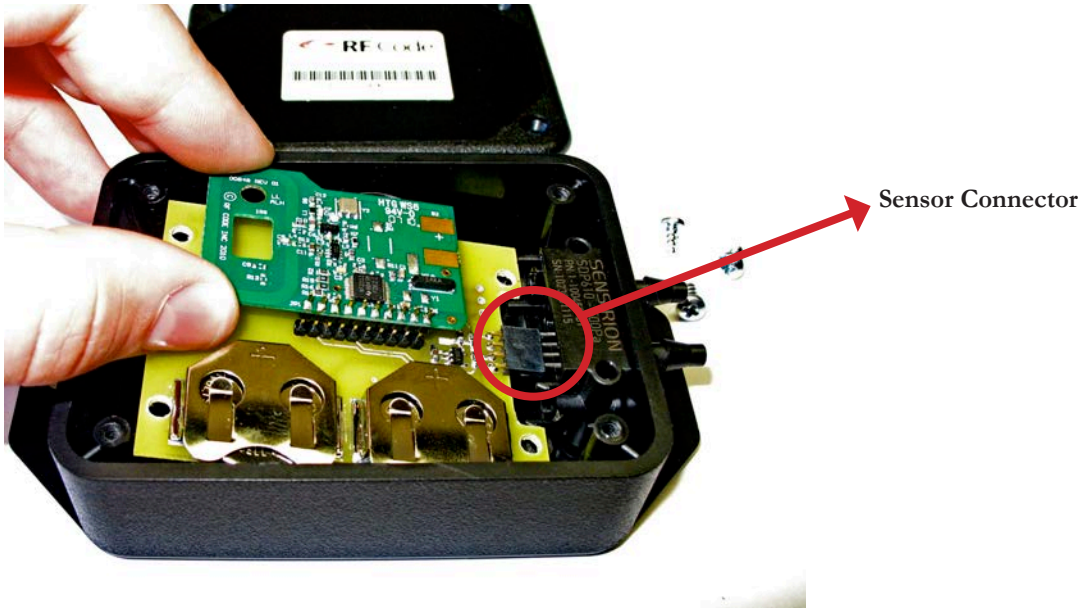


Figure 12: Sensor connector pins

8. Use the three small screws that you previously removed in Step #3 to secure the tag circuit board to the tag case.

9. Replace the tag cover and resecure in place using the four longer screws that were removed in Step #1.

10. Re-attach the plenum pressure tube to the **Plenum Pressure Tube Port** indicated by the **+** symbol ("top" tube port).

11. Access Sensor Manager software to test to ensure the R160 Air Pressure Tag is outputting readings before re-mounting tag into place in your deployment environment.

Environmental Conditions and Device Limitations

- **Operation Temperature**: -20° C to +70° C (-4° F to +158° F)
- **Storage Temperature**: -40° C to +80° C (-40° F to +176° F)
- **Differential Pressure Range**: +/- 2.0" H2O or +/- 500 Pa
- **Zero Point Accuracy**: 0.001" H2O or 0.2 Pa
- **Span Accuracy**: ±3.0% of reading
- **Resolution**: ±0.001"H2O or ±0.25 Pa
- **Sampling Rate**: 60 seconds

Limited Standard Warranty Terms

RF Code warrants its products to be free from defects in materials and workmanship for a period of 1 year (12 months) for hardware and software from the date of purchase from RF Code. Its obligation under this warranty is limited to repairing or replacing, at its own sole option, any such defective products. This warranty does not apply to equipment that has been damaged by accident, negligence, or misapplication or has been altered or modified in any way. This warranty applies only to the original purchaser (end-user) and is not transferable.

Standard Warranty Limitations

Except as provided herein, the entire liability of RF Code and its suppliers under this limited warranty will be that RF Code will use reasonable efforts to repair or replace, without charge, all defective Products returned to RF Code by Customer, all as more particularly described in the End User Warranty. Except for the express warranties STATED HEREIN, RF Code makes no other representations or warranties and RF Code hereby disclaims, all other warranties, express, implied, statutory, or otherwise, including without limitation, any warranty of merchantability, non-infringement of third party intellectual property rights, fitness for a particular purpose, performance, satisfactory quality, or arising from a course of dealing, usage or trade practice.

Obtaining Service & Support

For in-warranty service, customers have several options. Customers having difficulty with RF Code products should attempt to solve those problems through RF Code's Technical Support Problem Escalation Process:

First, contact the RF Code representative or other distributor from whom the RF Code product was purchased for information on how to obtain local support.
Second, contact the RF Code Customer Support via e-mail.
Third, contact the RF Code Customer Support via the Support Line.

For product returns, the support engineer will give you a return material authorization (RMA) number. No returns will be accepted without an RMA number. If the warranty expired, there is a charge for repair or replacement per RF Code's out-of-warranty policy. For full details of the RF Code RMA policy, please review the "RF Code Warranty, RMA, and Extended Warranty Policy" document.

RF Code Customer Support

RF Code Customer Support gives entitled customers and partners the ability to contact RF Code about installation and usage-related questions as well as make defect inquiries about eligible products that are covered under RF Code warranty agreements. A team of technical specialists can be contacted electronically or via phone.

The Support Line is available to provide General Support during normal business hours: Monday through Friday, 8:00am to 5:00pm Central time, excluding national holidays.

E-mail: support@rfcode.com
Support form: http://www.rfcode.com/Resources/Support/Support-Request.html
Voice: 512.439.2244 or toll-free at 866.830.4578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