

Installation, Operation and Maintenance Instructions



WIRELESS DATA COLLECTION GUIDE

ERIEZ MAGNETICS HEADQUARTERS: 2200 ASBURY ROAD, ERIE, PA 16506-1402 U.S.A.
WORLD AUTHORITY IN SEPARATION TECHNOLOGIES

Introduction

This manual details the proper steps for installing, operating and maintaining the Eriez SMART Wireless Data Collection Guide.

Careful attention to these requirements will assure the most efficient and dependable performance of this equipment.

If there are any questions or comments about the manual, please call Eriez at 814-835-6000 for SMART Wireless Data Collection assistance.

Warranty, Exclusions & Limitations

The workmanship and the materials of all products manufactured by Eriez are warranted for a period of one year from the date of shipment. This warranty covers parts and labor required to correct defects within the scope of the Corporation's warranty.

Excluded from the warranty coverage are products a) which have been subjected to electrical, mechanical or other misuse or abuse b) which have been disassembled or repaired, or attempted to be, by other than Eriez or its authorized servicing agents.

The foregoing warranty shall be in lieu of all other warranties, expressed or implied, and the Corporation expressly disclaims any warranty for merchant ability or fitness for a particular purpose.

Unless otherwise agreed in writing by the Corporation, repairs and replacement parts provided by the Corporation under its warranty shall be guaranteed only for the non-expired portion of the original warranty on the repaired product.

The liability of Eriez to any purchaser or user of its products shall not in any case exceed the cost of correcting defects in a product as herein provided and, upon expiration of the two years from the date of sale, all such liability shall terminate. In no event shall the Corporation be liable for interruption of operations, loss of profit, or special or consequential damages.

Software Updates

Future revisions of the software that correct errors will be made available to customers at no charge. Improvements and enhancements to the software will be available for a nominal fee.



CAUTION

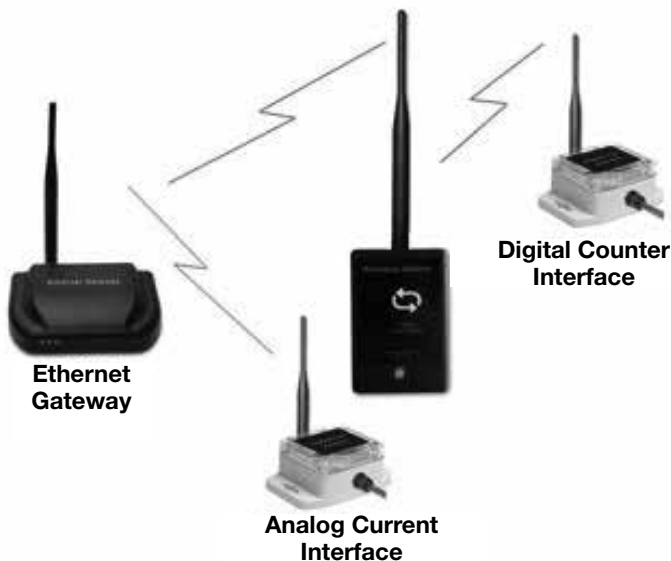
Safety labels must be affixed to this product. Should the safety label(s) be damaged, dislodged or removed, contact Eriez for replacement.

Description

The Eriez SMART Wireless Data Collection System is the foundation of every Eriez SMART monitoring application. As a proprietary wireless data network, it ties all Eriez SMART monitors to the Eriez SMART web portal for data analysis and reporting. This radio communications linked web portal then supports all Eriez SMART text and email alerts and alarms pertaining to each item of equipment being monitored.

Components

The Eriez SMART Wireless Data Collection System consists of a central Radio Frequency to Ethernet/Internet data portal, radio frequency data communication range extenders and several different types of machine parameter interfaces with integral radio frequency data transmitters which are included in specific Eriez SMART System products.



Principles of Operation

Each sensor/interface converts the particular machine parameter it is monitoring into digital data and transmits data samples by means of its integrated radio frequency transmitter to the central Ethernet/Internet gateway. The central Ethernet/Internet gateway then sends all data samples to the Eriez SMART web portal for analysis and reporting.

Because these radio transmitters and receivers operate in the 900MHz band, the radio signals travel only in straight lines from one antenna to another. This is termed “Line of Sight Propagation” and functions best if an observer at one antenna can actually see the antenna of the unit to which the data must be transmitted. These radio waves can pass through non-conductive materials such as concrete, wood, fiberglass, or plastic walls and partitions with varying reductions in signal strength. However, radio waves cannot pass through conductive materials such as metal enclosures, walls, machinery, roofing, etc.

When a clear line of sight exists between Eriez SMART Wireless Data Collection System components, those components can often communicate with each other when separated by up to 300 feet. When communications must be established over greater distances, or when conductive partitions, walls, or machinery block the direct line of sight between SMART components, an additional system device, known as a “Range Extender” can be placed at an intermediate point to relay the radio frequency data between those components.

As long as a direct line of sight of less than 300 feet can be established between the monitoring sensor/interface and the range extender, and a similar unobstructed line of sight of less than 300 feet can be established between the range extender and the Ethernet/Internet data portal, reliable communications can be established. For communications over greater distances, or for more complex signal paths to avoid multiple obstructions, additional range extenders can be installed and the radio frequency data will be relayed from one range extender to the next until it reaches the Ethernet/Internet gateway.

The Radio Frequency to Ethernet/Internet gateway is installed when the first Eriez SMART machine monitoring product is installed at a particular facility. Later, when other Eriez SMART machine monitoring products are installed at that same facility, they all communicate through the same original Ethernet/Internet gateway and do not need additional gateways to be installed. As many range extenders as necessary can be installed as needed to support additional Eriez SMART machine monitoring products at that same facility, connecting them all to the same Ethernet/Internet gateway by radio frequency data communications.

Trucks, excavators, and other machinery passing between the radio transmitters and receivers can block or disrupt the radio signals. Therefore, it is strongly recommended that all radio frequency components be located high enough above the ground that clear line of sight radio paths are established well above the height of any trucks or other machines that might pass between these components.

Installation

The site of the Ethernet/Internet gateway should be installed in a location where there is access to 115vac power, an Ethernet cable drop, in a location protected from rain, snow, and other environmental hazards, with unobstructed line-of-sight paths to as many locations where Eriez SMART machine monitors will be installed as possible, and high enough above the ground to prevent passing trucks and other machines from blocking the radio signal paths.

If necessary, the gateway may be installed in a non-conductive enclosure or building such as concrete, wood, fiberglass, or plastic. The gateway **MUST NOT** be installed in any type of metal building or enclosure. The gateway **MUST NOT** be installed in any type of electrical cabinet, networking equipment racks or enclosures, or in any type of metal building or enclosure of any kind. It is important to avoid installing the gateway in any location where the radio signal must pass through any area containing electrical equipment, electrical cabinets, electrical conduit or raceways, or other large metallic objects.

Also, the radio frequency line of sight paths must be planned to avoid any type of metal partitions,

metal walls, concrete walls with metal sheathing or covering of any kind, and any location where any metal is heaped, piled, or stacked high enough to block the radio signal path.

If no single unobstructed line of sight signal path of less than 300 feet can be arranged to a particular sensor/interface, then communications can still be achieved by constructing a signal path out of several unobstructed segments, joined by Eriez Wireless Range Extenders. At each Range Extender location, there must be provided a source of 115 VAC power.

When planning installation of Eriez Wireless Data Collection components, notice any other pre-existing equipment that has any radio antenna, and notify Eriez Customer Support of this potential interference.

When installing all Eriez SMART system components, assure that all the antennas are oriented vertically. A vertical antenna can communicate with another vertical antenna regardless of whether they are both vertically up, both vertically down, or one is vertically up while the other is vertically down. But, a vertical antenna cannot communicate with a horizontal antenna. All Eriez SMART equipment is designed to operate with the antenna in a vertical orientation. Never place the antenna of any Eriez SMART equipment in a horizontal orientation. In addition, each sensor/interface or range extender must be located more than 10 feet away from the gateway or range extender that it communicates with.

After installation, apply power and contact Eriez Customer Support to register the new equipment on the network.

The Ethernet Gateway can be configured to work with a network which uses either a DHCP server or a static IP address. The default mode is to work with a DHCP server. DHCP mode requires that Port 3000 be open and that the Gateway be allowed to access IP address 69.167.52.133. For networks that require a static IP address, please contact Eriez customer service for assistance.

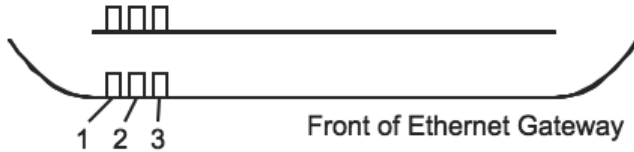
The Ethernet Gateway is secure and system specific. The Gateway has no operating system that can be compromised. It will receive data from the wireless sensor devices and then send the encoded data to the Eriez Portal via the internet. When the Eriez Portal is contacted by the Gateway, it will reply with any pending commands or updates back to the Gateway.



Using the Ethernet Gateway

Your Ethernet Gateway will be configured by Eriez factory.

1. Understanding the Ethernet Gateway Lights

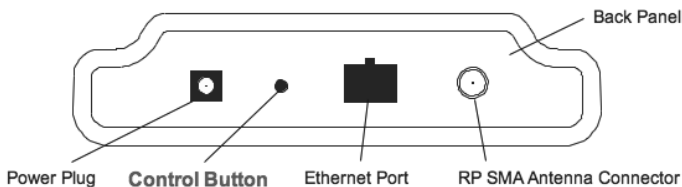


Light 1 - Indicates the Ethernet cable is plugged in. A green light indicates ready and working, a red light indicates there is a problem.

Light 2 - Indicates the Ethernet has internet connectivity and can reach the online monitoring system. A green light indicates ready and working, a red light indicates there is a problem. A flashing green light indicates network traffic to the internet.

Light 3 - Indicates sensor network activity. A green light indicates ready and working. A red light indicates there is a problem. A flashing green light indicates radio traffic from the sensors. If this light is not green, ensure sensor is powered up.

2. Ethernet Gateway Controls



Using the Control Button

The Control Button should only be used after consulting with Eriez customer support. Depending on how the Gateway is configured, depressing this button can delete special programming and revert the Gateway to default settings, thus making it unusable until it is re-programmed.

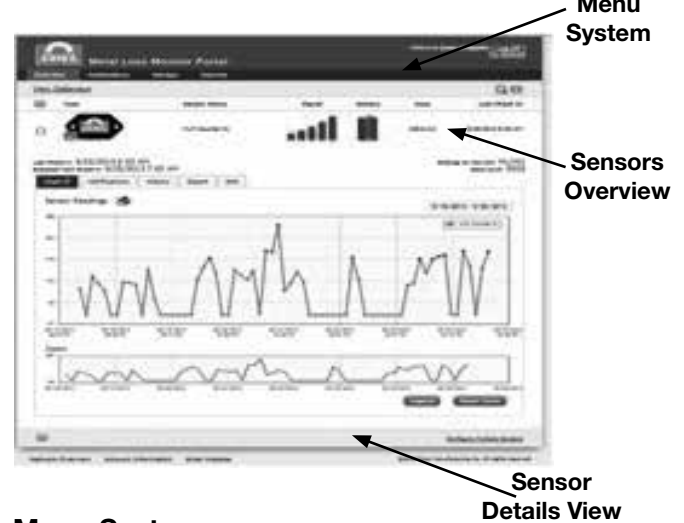
NOTE: If your gateway powers up with the lights scrolling from left to right, it has entered into boot loader mode accidentally. Make sure the button is free from obstruction and reboot the gateway by removing the power plug, waiting for 10 seconds then reinserting the power plug.

3. Using Eriez™ Online Wireless Sensor System

Understanding the Online Interface

When you log into the online system, the initial view shows all of your sensors' last recorded data.

View / Sort Features



Menu System

- Overview* Shows all sensors in the account and their last readings.
- Support* Support information for using sensors and software.

View / Sort Features

This section allows you to sort the sensors being viewed and search for sensors on your account.

Sensor Overview

Displays sensors on your account with their last reading and status information. Clicking on a sensor row expands the "Sensor Detail View" allowing you to view detailed information for the selected sensor.

Sensor Details View

Clicking on a sensor row on the “Overview” page expands the row to include a detailed sensor view for the selected sensor.

Select a tab to change between:

Chart Displays a graphical view of the selected sensor’s data.

History Displays a history of the selected sensor’s data.

NOTE: The data shown on the chart and history tabs is based on the date range indicated on the upper right side of the sensor detail information. To change the date range, click inside the date box.

Chart and History Views

Clicking on the “Chart” or “History” tabs within the sensor detail panel allows you to view the sensor’s data history in a graphical chart format or as text.



NOTE: To change the date range of the viewable information, click on the date range box at the top right of the sensor detail panel.

Eriez Wireless Range Extender Product Use Guide

Information to Users

This equipment has been tested and found to comply with the limits for a Class B digital devices, 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 instruction manual, 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 on a 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 not expressly approved by Eriez could void the user’s authority to operate the equipment.

RF EXPOSURE WARNING: *To satisfy FCC RF exposure requirements for mobile transmitting devices, a separation distance of 8 inches or more should be maintained between the antenna of this device and persons during device operation.*

To ensure compliance, operations at closer than this distance are not recommended. The antenna used for this transmitter must not be co-located in conjunction with any other antenna or transmitter.

The primary function of the Range Extender is to act as a range extender in places where wireless sensors are out of range of an Eriez wireless gateway.



Inside the Box

You should find the following items in the box:

- Eriez Wireless Range Extender
- Antenna

Eriez Wireless Range Extender

Principle of Operation

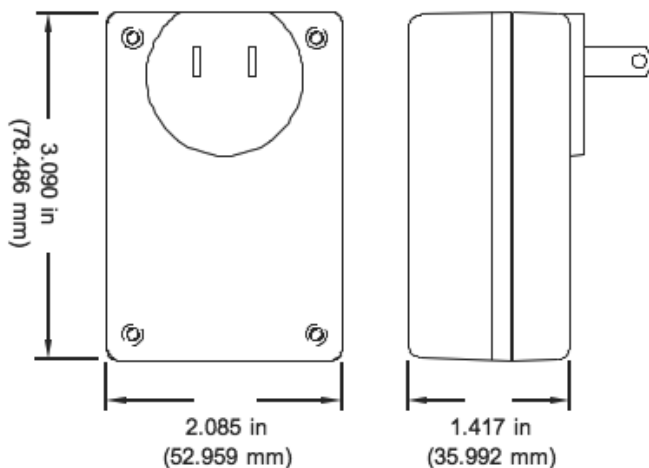
On power up, the range extender will locate a gateway that has the “best” signal available. The device then auto-configures itself to communicate and link with this gateway. After linking with the parent gateway, it then establishes itself as a sub-network with it’s own dedicated channel to the gateway, relieving congestion from multi-sensor networks.

Delays Associated with Using Wireless Range Extenders

Data coming from a sensor is delivered to a range extender and forwarded to the gateway. In all implementations where network traffic is kept below 6 messages per minute, the worst-case lag through a range extender to the network is 20 seconds. If more than 6 messages are generated by wireless sensors talking through a range extender, it is possible to experience data lag beyond 20 seconds.

Eriez Wireless Range Extender Features

- Extends the coverage area of your wireless sensor network.
- Supports 6 messages/minute.
- Built-in memory can queue up to 30,000 messages for delivery to the gateway.
- AC powered, so no batteries needed.



! IMPORTANT

If the range extender is unplugged or loses power, all sensor messages stored on the device will be lost!

Using the Wireless Range Extender

1. Adding a Wireless Range Extender to a Sensor Network

Eriez wireless range extenders can be added to any Eriez sensor network by contacting Eriez Customer Service.

Once the range extender has been added to your network by Eriez, you will need to reset the Gateway. For an Ethernet Gateway, power cycle the device by unplugging it, waiting 10 seconds then plugging it back in. For a Cellular Gateway, use the power button to turn it off, wait 10 seconds then turn it back on.

After resetting the gateway, plug the range extender into an AC wall outlet. The range extender will have a green light when it has found the network. If the light is steady red, check the network, unplug it and try again.

2. Wireless Range Extender Light Indicator

Flashing Red/Green – the range extender is looking for a gateway to join.

Solid Red – no network found.

Solid Green – range extender has joined a network.

Flashing Green – sensor data traffic is intercepted and relayed.

3. Wireless Range Extender Data

Date	Signal	Battery	Sensor Reading
7/16/2012 4:17 PM	39	100	DCnt:7 Rsm:7 Fls:0 Qu:1 Chan:24
7/16/2012 4:16 PM	39	100	DCnt:7 Rsm:7 Fls:0 Qu:1 Chan:24
7/16/2012 4:15 PM	36	100	DCnt:7 Rsm:7 Fls:0 Qu:1 Chan:24

The range extender reports on five data parameters. The first, **DCnt**, is for *Device Count* and indicates how many sensors the range extender is able to recognize as being in the network. This count may add up to all sensors in the network, or it may only indicate those sensors that are talking through it, depending on how the range extender was able to provision its network.

Rxm stands for *Received Messages*. In the above example, there were 7 messages that were picked up by the range extender and sent through to the network.

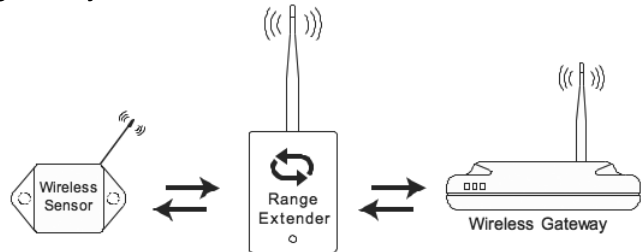
Fls stands for *Failures*. In the event that network traffic overwhelms the range extender, the number of messages that were attempted to be delivered but failed are recorded.

Qu stands for *Queue*. If the range extender is overwhelmed with message traffic, it will report on the number of messages it has queued, but has not delivered up to the network. As the range extender recovers, this number will dwindle until it gets back to 1 as messages are successfully delivered up to the network.

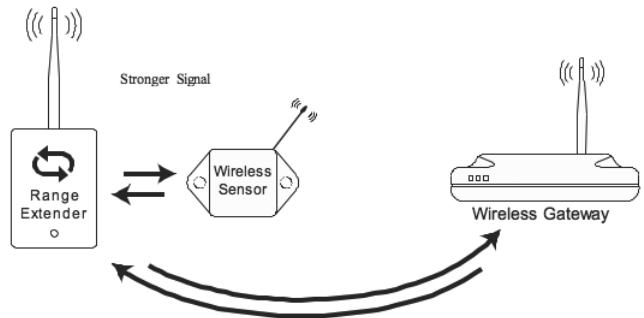
Chan stands for *Channel*. In the process of forming a sub network, the range extender picks a different channel on which to communicate to the sensors to help avoid accumulating too much traffic on the same network.

4. Wireless Range Extender - Determining Connections

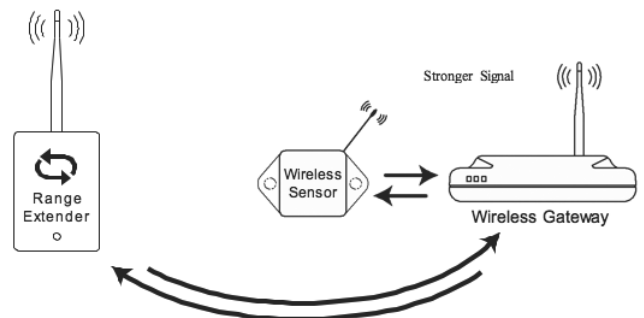
When using sensors with a wireless range extender, the sensors will automatically connect to the device with the strongest signal. The range extender should be placed between the sensor and the gateway.



If the sensor detects a stronger signal from the range extender, it will automatically connect to the range extender.



If the sensor detects a stronger signal from the gateway, it will automatically connect to the gateway and ignore the range extender.



Eriez Wireless Range Extender Specifications

Power	
Standard Operating Range	100-240 VAC
Max Operating Range	90-264 VAC
Input Frequency	50/60Hz +/- 3Hz
Max Power Consumption	1.0W
Wireless Operation	
Maximum Wireless Devices Per Gateway	Up to 100 Total Wireless Devices Per Gateway
Maximum Sensors Per Range Extender	Up to 99 Wireless Devices (Range extenders count as wireless devices)
Message Storage / Memory	30,000 Messages
Recommended Network Communications	Up to 6 Messages Per Minute
Range Extender Communication Delay	Up to 30 Seconds (at number of recommended network communications)
Mechanical	
LEDs	Single LED H/W Status / Activity - Flashing Red/Green (looking for a gateway to join) - Solid Red (no network found) - Solid Green (has joined a network) - Flashing Green (sensor data is received and relayed)
Enclosure	ABS Plastic UL94V-0 Flame Rating
Dimensions	3.09 x 2.085 x 1.417 in. (78.486 x 52.959 x 35.992 mm)
Weight	4.5 ounces
Environmental	
Operating Temperature	-40° to +85° C (-40° to +185°F)
FCC Approval:	ZTL- RFSC1

Eriez Wireless Range Extender FAQs

How can I tell if I need a range extender?

An authorized Eriez service technician will use an Eriez Button Sensor to assess the expected range of your environment. If the button sensor struggles to communicate with the gateway by flashing red, even occasionally, it is likely that any other sensor placed in the same location will struggle. You can also view the history of an operating sensor to see if you are getting good signal strength. If the signal strength is less than 50, or your button sensor is flashing red, even just occasionally, placing a range extender in between is advised.

What is the increase in range?

The range essentially doubles when a range extender is placed on the network. Depending on the environment, the range extender could increase the range of a sensor by up to 600 ft. Multiple range extenders can be chained together to allow for even further range. (Note that in multiple range extender networks, for every relay point the number of messages doubles.)

Does the range extender lose data if it is not able to deliver immediately?

No, as long as the range extender has not lost communication with the network. If the range extender still has a link to the network, but has been unable to deliver a message because of network traffic or due to failures, it has the ability to store all incoming data messages. They will be delivered one after another as soon as the communication link is clear again.



For additional information or more detailed instructions on how to use your Eriez Wireless Sensors or sensor monitoring software, please visit us on the web at <http://www.eriez.com/support/>





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