

# Centeron® SatComm Gateway Instruction Manual

Model # SAXXXXXXXXXXXXXX

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Table of Contents

**1 Introduction .....4**

**2 Product Overview .....4**

2.1 Description ..... 4

2.1.1 Product Markings ..... 4

2.1.1.1 Serial Number Field ..... 5

2.1.1.2 Model Number Field ..... 5

2.1.1.3 FCC Logo and Text Field ..... 5

2.1.1.4 Manufacturing Location and Patent Listing Field ..... 5

2.2 Operation ..... 6

2.3 Environmental Specifications ..... 6

2.4 Certifications ..... 6

2.4.1 FCC Notice – Radio Frequency Communications ..... 6

**3 Installation .....7**

3.1 Gateway-Monitor RF Site Guidelines ..... 7

3.2 Satellite Antenna Site Guidelines ..... 8

3.3 Gateway Site Guidelines ..... 8

3.4 Wiring ..... 9

3.4.1 Supply Power..... 9

3.4.1.1 AC Powered Units ..... 9

3.4.1.2 DC Powered Units ..... 9

3.4.2 Antenna ..... 10

3.4.2.1 Assembly..... 10

3.4.2.2 Installation ..... 10

3.4.2.3 Connection to Gateway ..... 10

3.5 Setup ..... 11

3.6 Activation ..... 11

**4 Service and Technical Support..... 12**

**1 Introduction**

This manual describes how to install, test and service the Centeron® SatComm Gateway (hereafter referred to as the Gateway). The Gateway is part of the Centeron® Level Monitoring System, which includes the Gateway and up to 25 Level Monitors (hereafter referred to as Monitors).

This manual does not include how to install, test, maintain or troubleshoot the Monitors. Refer to the individual Monitor’s instruction manuals for this information.

The description herein is based on a standard installation. The Gateway is to be installed as fixed, permanently connected equipment. This means that the Gateway should be fastened to a support and electrically connected to its supply by a permanent connection, which can only be detached by the use of a tool.

**2 Product Overview**

**2.1 Description**

The Gateway consists of a receiver that contains a local database of monitor information and a satellite modem that relays this information to a centralized data collector. A modular power supply can be a part of the Gateway.

**2.1.1 Product Markings**

Included on the housing of the Gateway is a label that contains important information about the product.



Figure 1 – Gateway Label Product Markings

#### 2.1.1.1 Serial Number Field

This field contains the ten-digit numeric I.D., which uniquely identifies the Gateway (and monitoring site) to the Centeron® system. The serial number is also bar coded in standard 128 Auto-switching Format for easy reading with bar code devices.

#### 2.1.1.2 Model Number Field

This field displays the current model number and revision of the device. Please be sure to identify this number when contacting service or technical support personnel.

#### 2.1.1.3 FCC Logo and Text Field

The FCC requires certification information and identification to appear on product labels. See Section 2.4.1 for more information on FCC certification.

#### 2.1.1.4 Manufacturing Location and Patent Listing Field

This field identifies the location of manufacturing and patents that apply to the product.

## 2.2 Operation

The Gateway contains a satellite modem module and can receive Radio Frequency (RF) signals from 1 to 25 unique Monitors. The Gateway communicates with the Data Collection System via the Orbcomm Low Earth Orbit (LEO) satellite network. The Gateway sends monitor data from its internal database and then receives commands and setup information from the Data Collection System. See Figure 4 in Appendix A for an illustration of the Centeron® Level Monitoring System.

The Level Monitoring System utilizes spread spectrum technology for communications in the 902-928 MHz band in accordance with the Federal Communications Commission (FCC) rules.

The Gateway derives its power from the AC line via an internal 12VDC power module or an external DC power source.

## 2.3 Environmental Specifications

The following environmental specifications should be observed when installing the Gateway:

- Ambient Temperature Range: -40°C to +60°C
- Designed for outdoor use (Raintight).

## 2.4 Certifications

This equipment complies with Part 15 of the FCC Rules.

### 2.4.1 FCC Notice – Radio Frequency Communications

The Gateway generates and uses radio frequency energy. If not installed and used in accordance with the manufacturer's it may cause interference to radio and television reception. The controller PCA has been tested and found to comply with Part 15 of Radiators and FCC Rules for Class B Computing Devices.

**CAUTION:** Robertshaw Industrial Products does not support field changes or modifications to any of the Centeron® Level Monitoring System equipment unless they are specifically covered in this manual. All adjustments are made at the factory under the specific guidelines set forth in our manufacturing processes. Any modification to the equipment will void the manufacturer's warranty and could void the user's authority to operate the equipment and render the equipment in violation of FCC Part 15, Subpart C, 15.247.

### 3 Installation

#### 3.1 Gateway-Monitor RF Site Guidelines

The Gateway should be mounted in accordance with Section 3.3 and the location should be selected in accordance with the following guidelines:

- Direct line of sight between the Centeron® Monitor and the Gateway will provide optimum radio reception.
- The Centeron® Monitor and the Gateway can communicate at distances up to one mile under optimum line-of-site conditions.
- When obstructions such as walls, buildings and vehicles exist between the Centeron® Monitor and the Gateway the distance between these units should be limited to less than 500 feet.
- Multiple obstructions (such as two or more walls or a tank and a wall) should be avoided, if possible.
- Electrically conductive objects, such as metal buildings, concrete reinforcing rods, tanks silos and vehicles reflect radio signals. This reflection can be either an advantage or a disadvantage to good radio reception at a particular installation site:
  - 1 Metal objects between the Monitor and the Gateway may reflect and scatter RF energy and reduce radio signal strength at the Gateway.
  - 2 Metal objects behind the Monitor or Gateway may increase the radio signal strength at the Gateway by reflecting radio signals toward the Gateway.
- Even small objects such as tank vents or toolboxes between the Monitor and the Gateway can significantly reduce radio signal strength if they are within a few feet of the Monitor or Gateway. These objects can reflect radio signals and cause an RF "shadow" which may prevent radio signals from reaching the Gateway.
- Objects which are not electrically conductive such as wooden or fiberglass buildings, non-reinforced masonry,

trees, plastic and glass have less effect on radio signals than metal objects.

- Windows and wooden doors can provide radio signals access to otherwise closed metal buildings. However, "low-E" window glass may have a thin metallic coating that can reflect radio signals.
- Strong electromagnetic fields such as those found in close proximity to power lines, large electric motors, generators, electric fences and transmitter antennas may interfere with the radio signal received by the Gateway.
- The Gateway should be mounted as high as is reasonably possible to improve its ability to receive radio signals. For example, placing the Gateway high on a wall would be preferable to mounting at a low level. Installing the Gateway in an underground basement should be avoided.

**Warning:** For maximum Monitor reception, mount the Monitor within 500 feet of the Gateway, avoid mounting the Monitor inside a fully closed metal building and avoid close proximity to large electrical equipment.

#### 3.2 Satellite Antenna Site Guidelines

The satellite communications antenna also requires proper site selection to provide for optimal communications.

- The antenna should be mounted a minimum of twelve feet above the ground, or rooftop.
- The antenna should be located at least ten feet away from structures and electrical fields.
- The antenna should have an unobstructed view of the sky and the horizon.

#### 3.3 Gateway Site Guidelines

The Gateway is housed in a 11" High x 7.5" Wide x 5.25" Deep PBT/PC blend plastic enclosure designed for outdoor mounting on a vertical surface. The enclosure is provided with four (4) M5 threaded mounting holes on a 9.813" High x 6" Wide pattern. It is intended that the unit be mounted with the wire entrances on the bottom. Care should be taken when installing the mounting screws to be certain that the enclosure is not damaged.

### 3.4 Wiring

The wiring connections are accessed by first removing the cover of the enclosure by loosening the four screws fastening it to the base. Once the cover is loose the two cables should be unplugged from the main PCA and the cover sub-assembly carefully set aside.

#### 3.4.1 Supply Power

The Gateway enclosure is supplied with a ½" conduit entrance hole in the bottom, right-hand, side of the enclosure. The installer must use the proper fitting to maintain the weatherproof integrity of the enclosure

##### 3.4.1.1 AC Powered Units

The Gateway requires 100-240VAC, 1A, 50/60Hz supply power. The connections for this power are located on the power module on the right-hand side of the printed circuit assembly, PCA, inside the enclosure. The connection for ground is located on the lower right hand side of the PCA. The connections are shown in the following table:

Terminal	Function
⊕	Earth Ground
ACN	AC Neutral
ACL	AC Line

The wiring must be in accordance with any local, state, and/or national regulations. The installer must install an external switch or circuit breaker to provide a means of disconnecting the Gateway from the supply power. The external switch, or circuit breaker, must be marked as the disconnecting device for the Gateway.

The power supply input is equipped with a 3.15A protective fuse. A 3.15A protective fuse (F1) is provided on the PCA to protect the power supply output.

##### 3.4.1.2 DC Powered Units

12VDC Gateways require 9 -18VDC (3.0 AMP) supply power. The connections for this power are located on the terminal strip (TB1) on the upper, right-hand, side of the printed circuit assembly, PCA, inside the enclosure. The connection for ground is located on the lower right hand side of the PCA. The connections are shown in the following table:

Terminal	Function
+	+12 VDC
-	Common
⊕	Earth Ground

24VDC Gateways require 17 - 32VDC (3.0 AMP) supply power. The connections for this power are located on the Power Converter module on the right-hand, side of the printed circuit assembly, PCA, inside the enclosure (crimp-on spade terminals are provided). The ground connection is located on the lower right hand side of the PCA. The connections are shown in the following table:

Terminal	Function
17-32V	+24 VDC
0V	Common
⊕	Earth Ground

All wiring must be in accordance with any local, state, and/or national regulations. The installer must install an external switch or circuit breaker to provide a means of disconnecting the Gateway from the supply power. The external switch, or circuit breaker, must be marked as the disconnecting device for the Gateway.

A 3.15A protective fuse (F1) is provided on the PCA to protect the DC input.

#### 3.4.2 Antenna

##### 3.4.2.1 Assembly

The antenna is to be assembled in accordance with the instructions supplied with the antenna.

##### 3.4.2.2 Installation

In addition to the site selection guidelines above the antenna must be installed in accordance with NEC Article 810. The use of a lightning arrester is at the discretion of the installer.

##### 3.4.2.3 Connection to Gateway

The supplied antenna should be connected to the satellite modem using the supplied weatherproof bushing. The antenna lead-in cable should be fed through the bushing and attached to the SMA connector on the modem. It is preferable that a service loop be

created within the enclosure prior to tightening the bushing to obtain a weatherproof seal.

**Warning:** *The weatherproof bushing must be tightened using wrenches to obtain a weatherproof seal.*

Reconnect the cables from the cover sub-assembly and reattach the cover using the four screws supplied.

**Warning:** *The cover screws must be tightened sufficiently to obtain a weatherproof seal.*

### 3.5 Setup

After the Gateway has been wired and mounted, and prior to applying power the Gateway must be added to Data Collection System (including adding the Gateway and Monitor serial numbers into the database)

### 3.6 Activation

Following wiring and setting up the Gateway, the unit can be activated by turning on the supply power. The Gateway will go through a test cycle (2-3 seconds) during which time the LED's will cycle, testing each color (Red, Green & Yellow). The Gateway will then enter an initialization phase during which time L1, MODEM status, will be steady red and L2, Controller status, will be blinking red. Once a satellite is in view the Gateway clock will be synchronized to the satellite system UTC clock. The Gateway will then enter the normal operating mode. The indicators (L1-L3) will indicate the status of the Gateway as follows:

#### L1 – MODEM Status

- Blinking Orange (short) – Communicating with controller.
- Steady Red – Communications with controller failed.
- Steady Orange – No satellite in view, messages waiting.
- Steady Green – Satellite in view, sending messages.
- Blinking Orange (2sec/min) – No Satellite in view, nothing to send.
- Blinking Green (2sec/min) – Satellite in view, nothing to send.

#### L2 – Controller Status

- Blinking Red – No communications with MODEM.
- Blinking Orange – Messages waiting to send.
- Blinking Green – All messages sent.

#### L3 – RF Status

- Blinking Green – Transmission received from a valid monitor.
- Blinking Red – Transmission received from an invalid monitor.

## 4 Service and Technical Support

If you experience trouble with this equipment, please contact:

**Robertshaw Industrial Products Technical Support at (865) 981-3118, Monday through Friday, EST 8:00 a.m. to 5:00 p.m.**

**This unit is to be serviced by qualified service personnel only.**



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