



**INSTALLATION AND SETUP GUIDE**  
**VERSION 2.1**

**SENSAPHONE<sup>®</sup>**  
REMOTE MONITORING SOLUTIONS

## Sentinel Installation and Setup Guide

Every effort has been made to ensure that the information in this document is complete, accurate and up-to-date. Sensaphone assumes no responsibility for the results of errors beyond its control. Sensaphone also cannot guarantee that changes in equipment made by other manufacturers, and referred to in this manual, will not affect the applicability of the information in this manual.

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Written and produced by SENSAPHONE®.

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# Important Safety Instructions

Your Sentinel has been carefully designed to give you years of safe, reliable performance. As with all electrical equipment, however, there are a few basic precautions you should take to avoid hurting yourself or damaging the unit:

- Read the installation and operating instructions in this guide carefully. Be sure to save it for future reference.
- Read and follow all warning and instruction labels on the product itself.
- To protect the Sentinel from overheating, make sure all openings on the unit are not blocked. Do not place on or near a heat source, such as a radiator or heat register.
- Do not use your Sentinel near water, or spill liquid of any kind into it.
- Be certain that your power source matches the rating in the specifications of this manual. If you're not sure of the type of power supply to your facility, consult your dealer or local power company.
- Do not allow anything to rest on the power cord. Do not locate this product where the cord will be abused by persons walking on it.
- Do not overload wall outlets and extension cords, as this can result in the risk of fire or electric shock.
- Never push objects of any kind into this product through ventilation holes as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electric shock.
- To reduce the risk of electric shock, do not disassemble this product, but return it to Sensaphone Customer Service, or another approved repair facility, when any service or repair work is required. Opening or removing covers may expose you to dangerous voltages or other risks. Incorrect reassembly can cause electric shock when the unit is subsequently used.
- If anything happens that indicates that your Sentinel is not working properly or has been damaged, unplug it immediately and follow the procedures in the manual for having it serviced. Return the unit for servicing under the following conditions:
  1. The power cord or plug is frayed or damaged.
  2. Liquid has been spilled into the product or it has been exposed to water.
  3. The unit has been dropped, or the enclosure is damaged.
  4. The unit doesn't function normally when you're following the operating instructions.
- To reduce the risk of fire or injury to persons, read and follow these instructions:
  1. Use only the specified type and size battery.
  2. Do not dispose of the battery in a fire. The cell may explode. Check with local codes for possible special disposal instructions.
  3. Do not open or mutilate batteries. Released electrolyte is corrosive and may cause damage to the eyes or skin. It may be toxic if swallowed.
  4. Exercise care in handling batteries in order not to short the battery with conducting materials such as rings, bracelets, and keys. The battery or conductor may overheat and cause burns.
  5. Remove main power connections before replacing the battery.

### **FCC Requirements**

Part 15: 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 instructions, 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.

## 2 YEAR LIMITED WARRANTY

PLEASE READ THIS WARRANTY CAREFULLY BEFORE USING THE PRODUCT.

THIS LIMITED WARRANTY CONTAINS SENSAPHONE'S STANDARD TERMS AND CONDITIONS. WHERE PERMITTED BY THE APPLICABLE LAW, BY KEEPING YOUR SENSAPHONE PRODUCT BEYOND THIRTY (30) DAYS AFTER THE DATE OF DELIVERY, YOU FULLY ACCEPT THE TERMS AND CONDITIONS SET FORTH IN THIS LIMITED WARRANTY.

IN ADDITION, WHERE PERMITTED BY THE APPLICABLE LAW, YOUR INSTALLATION AND/OR USE OF THE PRODUCT CONSTITUTES FULL ACCEPTANCE OF THE TERMS AND CONDITIONS OF THIS LIMITED WARRANTY (HEREINAFTER REFERRED TO AS "LIMITED WARRANTY OR WARRANTY"). IF YOU DO NOT AGREE TO THE TERMS AND CONDITIONS THIS WARRANTY, INCLUDING ANY LIMITATIONS OF WARRANTY, INDEMNIFICATION TERMS OR LIMITATION OF LIABILITY, THEN YOU SHOULD NOT USE THE PRODUCT AND SHOULD RETURN IT TO THE SELLER FOR A REFUND OF THE PURCHASE PRICE. THE LAW MAY VARY BY JURISDICTION AS TO THE APPLICABILITY OF YOUR INSTALLATION OR USE ACTUALLY CONSTITUTING ACCEPTANCE OF THE TERMS AND CONDITIONS HEREIN AND AS TO THE APPLICABILITY OF ANY LIMITATION OF WARRANTY, INDEMNIFICATION TERMS OR LIMITATIONS OF LIABILITY.

- 1. WARRANTOR:** IN THIS WARRANTY, WARRANTOR SHALL MEAN "DEALER, DISTRIBUTOR, AND/OR MANUFACTURER."
- 2. ELEMENTS OF WARRANTY:** THIS PRODUCT IS WARRANTED TO BE FREE FROM DEFECTS IN MATERIALS AND CRAFTSMANSHIP WITH ONLY THE LIMITATIONS AND EXCLUSIONS SET OUT BELOW.
- 3. WARRANTY AND REMEDY:** TWO-YEAR WARRANTY — IN THE EVENT THAT THE PRODUCT DOES NOT CONFORM TO THIS WARRANTY AT ANY TIME DURING THE TIME OF TWO YEARS FROM ORIGINAL PURCHASE, WARRANTOR WILL REPAIR THE DEFECT AND RETURN IT TO YOU AT NO CHARGE.

THIS WARRANTY SHALL TERMINATE AND BE OF NO FURTHER EFFECT AT THE TIME THE PRODUCT IS: (1) DAMAGED BY EXTRANEOUS CAUSE SUCH AS FIRE, WATER, LIGHTNING, ETC. OR NOT MAINTAINED AS REASONABLE AND NECESSARY; OR (2) MODIFIED; OR (3) IMPROPERLY INSTALLED; OR (4) MISUSED; OR (5) REPAIRED OR SERVICED BY SOMEONE OTHER THAN WARRANTORS' AUTHORIZED PERSONNEL OR SOMEONE EXPRESSLY AUTHORIZED BY WARRANTOR'S TO MAKE SUCH SERVICE OR REPAIRS; (6) USED IN A MANNER OR PURPOSE FOR WHICH THE PRODUCT WAS NOT INTENDED; OR (7) SOLD BY ORIGINAL PURCHASER.

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INDEMNIFICATION AND COVENANT NOT TO SUE: YOU WILL INDEMNIFY, DEFEND AND HOLD HARMLESS WARRANTORS, THEIR OWNERS, DIRECTORS, OFFICERS, EMPLOYEES, AGENTS, SUPPLIERS OR AFFILIATED COMPANIES, AGAINST ANY AND ALL CLAIMS, DEMANDS OR ACTIONS BASED UPON ANY LOSSES, LIABILITIES, DAMAGES OR COSTS, INCLUDING BUT NOT LIMITED TO DAMAGES THAT ARE DIRECT OR INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL, AND INCLUDING ATTORNEYS FEES AND LEGAL COSTS, THAT MAY RESULT FROM THE INSTALLATION, OPERATION, USE OF, OR INABILITY TO USE WARRANTORS' PRODUCTS AND SERVICES, OR FROM THE FAILURE OF THE WARRANTORS' SYSTEM TO REPORT A GIVEN EVENT OR CONDITION, WHETHER OR NOT CAUSED BY WARRANTORS' NEGLIGENCE.

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EXCLUSIVE WARRANTY: THE LIMITED WARRANTY OR WARRANTIES DESCRIBED HEREIN CONSTITUTE THE SOLE WARRANTY OR WARRANTIES TO THE PURCHASER. ALL IMPLIED WARRANTIES ARE EXPRESSLY DISCLAIMED, INCLUDING: THE WARRANTY OF MERCHANTABILITY AND THE WARRANTY OF FITNESS FOR A PARTICULAR USE AND THE WARRANTY OF FITNESS FOR A

## Sentinel Installation and Setup Guide

PARTICULAR PURPOSE AND THE WARRANTY OF NON-INFRINGEMENT AND/OR ANY WARRANTY ARISING FROM A COURSE OF DEALING, USAGE, OR TRADE PRACTICE.

IT MUST BE CLEAR THAT THE WARRANTORS ARE NOT INSURING YOUR PREMISES OR BUSINESS OR GUARANTEEING THAT THERE WILL NOT BE DAMAGE TO YOUR PERSON OR PROPERTY OR BUSINESS IF YOU USE THIS PRODUCT. YOU SHOULD MAINTAIN INSURANCE COVERAGE SUFFICIENT TO PROVIDE COMPENSATION FOR ANY LOSS, DAMAGE, OR EXPENSE THAT MAY ARISE IN CONNECTION WITH THE USE OF PRODUCTS OR SERVICES, EVEN IF CAUSED BY WARRANTORS' NEGLIGENCE. THE WARRANTORS ASSUME NO LIABILITY FOR INSTALLATION OF THE PRODUCT AND/OR INTERRUPTIONS OF THE SERVICE DUE TO STRIKES, RIOTS, FLOODS, FIRE, AND/OR ANY CAUSE BEYOND SELLER'S CONTROL, FURTHER SUBJECT TO THE LIMITATIONS EXPRESSED IN ANY LICENSE AGREEMENT OR OTHER AGREEMENT PROVIDED BY WARRANTORS TO PURCHASER.

THE AGREEMENT BETWEEN THE WARRANTORS AND THE PURCHASER, INCLUDING BUT NOT LIMITED TO THE TERMS AND CONDITIONS HEREIN SHALL NOT BE GOVERNED BY THE CONVENTION FOR THE INTERNATIONAL SALE OF GOODS. WHERE APPLICABLE, THE UNIFORM COMMERCIAL CODE AS ADOPTED BY THE STATE OF DELAWARE SHALL APPLY.

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**6. CHOICE OF FORUM AND CHOICE OF LAW:** IN THE EVENT THAT A DISPUTE ARISES OUT OF OR IN CONNECTION WITH THIS LIMITED WARRANTY, THEN ANY CLAIMS OR SUITS OF ANY KIND CONCERNING SUCH DISPUTES SHALL ONLY AND EXCLUSIVELY BE BROUGHT IN EITHER THE COURT OF COMMON PLEAS OF DELAWARE COUNTY, PENNSYLVANIA OR THE UNITED STATES DISTRICT COURT FOR THE EASTERN DISTRICT OF PENNSYLVANIA.

REGARDLESS OF THE PLACE OF CONTRACTING OR PERFORMANCE, THIS LIMITED WARRANTY AND ALL QUESTIONS RELATING TO ITS VALIDITY, INTERPRETATION, PERFORMANCE AND ENFORCEMENT SHALL BE GOVERNED BY AND CONSTRUED IN ACCORDANCE WITH THE LAWS OF THE STATE OF DELAWARE, WITHOUT REGARD TO THE PRINCIPLES OF CONFLICTS OF LAW.

Effective date 02/25/2015

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# TABLE OF CONTENTS

<b>CHAPTER 1: INSTALLATION</b> .....	<b>9</b>
<b>INTRODUCTION</b> .....	<b>9</b>
FEATURES .....	9
TECHNICAL SUPPORT .....	9
<b>ABOUT THIS MANUAL</b> .....	<b>9</b>
<b>INSTALLATION AND CONFIGURATION</b> .....	<b>10</b>
PHYSICAL DESCRIPTION .....	10
LAYOUT .....	10
SENSOR INPUTS .....	10
POWER LED (GREEN) .....	10
ALARM LEDS (RED) .....	10
ONLINE LED (GREEN) .....	10
STANDBY LED (YELLOW) .....	10
ACKNOWLEDGE/ STANDBY BUTTON .....	11
<b>INSTALLATION</b> .....	<b>11</b>
PARTS REQUIRED .....	11
OPERATING ENVIRONMENT .....	11
POWER .....	11
CELLULAR ACTIVATION .....	11
ANTENNA INSTALLATION .....	11
WALL MOUNT INSTALLATION .....	12
TURNING THE UNIT ON .....	12
TURNING THE UNIT OFF .....	13
POWER SUPPLY .....	13
<b>CONNECTING SENSORS</b> .....	<b>14</b>
GENERAL WIRING CONSIDERATIONS .....	14
NORMALLY OPEN / NORMALLY CLOSED DRY CONTACTS .....	15
2.8K/10K TEMPERATURE SENSORS .....	15
4-20MA CURRENT LOOP TRANSDUCERS .....	16
RELAY OUTPUT WIRING .....	16
BATTERY BACKUP .....	17
MEMORY/CLOCK BATTERY .....	17
RESETTING THE SENTINEL TO FACTORY DEFAULT SETTINGS .....	17
<b>CHAPTER 2: SET UP</b> .....	<b>18</b>
<b>DESCRIPTION OF WEB PAGES</b> .....	<b>18</b>
DASHBOARD .....	18
<b>STANDBY MODE</b> .....	<b>19</b>
DEVICE DETAILS .....	19
CONFIGURE DEVICE .....	20
ZONE PARAMETER DEFINITIONS .....	21
MANAGE USERS .....	22
MANAGE USER GROUPS .....	25
ALARM DELIVERY .....	25

LOGS . . . . .	26
DEVICE MANAGEMENT . . . . .	27
DEVICE GROUPS . . . . .	28
ACCOUNT SETTINGS . . . . .	28
<b>CHAPTER 3: CONFIGURING THE RELAY OUTPUT . . . . .</b>	<b>29</b>
RELAY OUTPUT WIRING . . . . .	30
<b>APPENDIX A: WEEKLY TESTING PROCEDURE . . . . .</b>	<b>31</b>
<b>APPENDIX B: ACCESSORIES . . . . .</b>	<b>32</b>
<b>APPENDIX C: SPECIFICATIONS . . . . .</b>	<b>33</b>
ALERT ZONES . . . . .	33
RELAY OUTPUT . . . . .	33
DATA LOGGING . . . . .	33
COMMUNICATION TYPE: . . . . .	33
POWER SUPPLY . . . . .	33
BATTERY BACKUP . . . . .	34
ENVIRONMENTAL . . . . .	34
PHYSICAL . . . . .	34
<b>APPENDIX D: THERMISTORS . . . . .</b>	<b>35</b>
2.8K THERMISTOR DATA . . . . .	35
10K THERMISTOR DATA . . . . .	35
<b>APPENDIX E: POST &amp; CONNECTION ERROR CODES . . . . .</b>	<b>36</b>
<b>APPENDIX F: RETURNING THE UNIT FOR REPAIR . . . . .</b>	<b>38</b>
<b>APPENDIX G: TEST LOG . . . . .</b>	<b>39</b>



# CHAPTER 1: INSTALLATION

## INTRODUCTION

Congratulations on your purchase of the Sentinel Monitoring System. The system is designed to be an easy, cost-effective, cloud-based monitoring and data logging system to notify you when equipment or conditions go awry. The internet browser-based programming makes the device easy to use from any computer or tablet. Monitored conditions can include temperature, humidity levels, pressure, flow, leak detection, UPS systems, and more. The system allows multiple users to be notified immediately of any detected problems. Notification can occur via voice call, e-mail or SMS (text message). The internal battery backup system insures the unit will continue to run if main power fails.

## FEATURES

The Sentinel includes the following key features:

- Twelve sensor inputs to monitor environmental conditions and/or alarm contacts from other equipment.
- Battery backup for uninterrupted performance.
- Notification via e-mail, text message (optional) and voice call (optional).
- Relay outputs capable of automatic or manual control.
- Cloud-based user interface for programming, data storage, and alarm delivery.
- Comes standard in weatherproof NEMA 4X enclosure
- Cellular modem available for use with AT&T, Verizon and Rogers service

## TECHNICAL SUPPORT

If any questions arise upon installation or operation of the Sentinel, please contact the Sensaphone Technical Service Department at 610.558.2700 and have the following information available:

- Date of purchase \_\_\_\_\_
- Serial number \_\_\_\_\_

Technical support is available from 8:00 AM to 5:00 PM, M-F, eastern time.

## ABOUT THIS MANUAL

This manual comprises the instructions necessary to install and setup the Sentinel. You should thoroughly read this manual to establish a basic understanding of the system and keep it as a reference.

## INSTALLATION AND CONFIGURATION

### PHYSICAL DESCRIPTION

The Sentinel is housed in a 14" x 12" x 7.4" enclosure, which can be easily mounted on a wall or back panel.

### LAYOUT

The Sentinel has connections for twelve sensor inputs, an Ethernet port, and 12VDC power. See figure below:



Figure 1: Front Layout of the Sentinel

- |                                |                                |
|--------------------------------|--------------------------------|
| 1) Acknowledge/Standby Button  | 6) Ethernet Jack               |
| 2) On/Off Switch               | 7) Sensor Input Terminal Strip |
| 3) Power, Online, Standby LEDs | 8) Relay Output Input          |
| 4) Alarm LEDs                  | 9) Battery Module              |
| 5) Power Jack                  | 10) Cellular Modem             |

### SENSOR INPUTS

The sensor inputs labeled zones 1-12 are designed to interface with normally open/normally closed devices, 2.8K or 10K temperature sensors and 4-20mA transducers.

### POWER LED (GREEN)

This light indicates that the Sentinel unit is powered and operational.

### ALARM LEDS (RED)

The Alarm LEDs indicate if an alarm exists.

### ONLINE LED (GREEN)

This light indicates that the Sentinel unit is communicating with the Sentinel servers.

### STANDBY LED (YELLOW)

This light indicates that the Sentinel unit is in standby mode.

## ACKNOWLEDGE/ STANDBY BUTTON

When an unacknowledged alarm exists (as indicated by a blinking red alarm LED), briefly press the button and the alarm LED will stop blinking, indicating that the alarm is acknowledged. To enter Standby mode, press and hold the button for at least 5 seconds until the Standby LED lights up, then release. To exit from Standby mode, hold the button down for 5 seconds until the Standby LED turns off.

## INSTALLATION

This section provides information on:

- Operating environment
- Installation
- Connecting sensors
- Network Configuration

## PARTS REQUIRED

- Screwdriver
- Computer w/Internet Connection

## OPERATING ENVIRONMENT

Before you install the Sentinel be sure that your operating environment meets the physical requirements of the equipment.

Operating Temperature:	32° – 122° Fahrenheit (0° – 50° C)
Humidity:	5 – 90 %RH, non-condensing
Power:	115VAC 50/60 Hz outlet within 6'

## POWER

Plug the power adapter into a 115V AC power outlet.

## CELLULAR ACTIVATION

This device requires activation on the cellular network to operate. Fill-out the subscription registration form included with device and send to it Sensaphone to complete the activation process. Once it is activated power-up the device and allow a few minutes for the Sentinel to boot-up and for the modem to connect to the cellular network. Make sure the Online LED glows steadily, indicating that the device is communicating with Sensaphone.net server system. Once its online you will be able to access the device through the Sensaphone.net website.

## ANTENNA INSTALLATION

**Bracket Mounting** - Select a suitable mounting location for the antenna on the desired surface. The orientation of the antenna should be vertical with the cable exiting downwards. When selecting a mounting location care should be taken to ensure that at least 300mm (12”) of separation is maintained between the antenna and nearby metal objects and surfaces.

When mounting the antenna to a metal housing, device enclosure or mast, care should be taken to ensure that the antenna housing is elevated above the metal surface to which it is mounted. Ensure that the selected location will enable the coaxial cable to be easily routed to the equipment. If mounting the antenna using screws it is important to check for adequate under panel clearance. It is important for RF performance that the antenna is only bracket mounted using the supplied bracket. Mounting the antenna utilizing a different bracket may adversely affect performance. The antenna can be mounted via the four 4.5mm fixing holes (suitable for M4 machine screws or 4mm self-tapping screws) or mast mounted using a jubilee or

## Sentinel Installation and Setup Guide

worm drive hose clip with a maximum width of 14mm (1/2"). If you will be drilling holes to mount the antenna, the bracket can be used as a drilling template.

When ready, mount the antenna securely to the bracket using the supplied nut and washer. It is not necessary to remove the backing from the supplied adhesive pad but the pad can be utilized if a more permanent fitment to the bracket is desired. If utilizing the adhesive pad, ensure that the top surface of the bracket is clean and dry, remove the backing from the adhesive pad and stick the antenna to the bracket applying firm pressure.

**Panel Mounting** - Select a suitable location. The antenna must be fitted to a conductive ground plane of adequate size. It will fit panels of between 1-12mm thick (0.04-0.47"). The recommended minimum diameter of the surface is 200mm (8"). Select a mounting location taking care to ensure that there is at least 300mm (12") of clearance from proximate metal objects. Ensure that there is adequate clearance under the mounting panel and measure to check for central positioning if necessary. Mask the panel area around the hole position to protect the surface / paintwork. Drill a pilot hole, then increase the hole size to 14mm (0.55"), ensuring that the drill / cutter bit does not hit any objects under the panel. Clean the area around the hole carefully removing all swarf. Remove any paint and primer from underneath the panel surface to ensure adequate electrical contact using washer and nut. Remove the nut and washer and then the adhesive pad backing from the underside of the antenna and feed the coaxial cable through the panel. Position the antenna over the mounting hole and stick it to the panel applying firm pressure. Assemble the nut and washer from under the panel and tighten fully.

**Routing The Coaxial Cable** - Route the coaxial cable to the Sentinel, taking care to avoid running adjacent to existing wiring or fouling any moving controls or components.

## WALL MOUNT INSTALLATION

The NEMA 4X enclosure (14" x 12" x 7.4") comes with mounting feet that must be attached to the bottom of the enclosure. The drawing below shows the location of the mounting feet for attaching the enclosure to a wall:

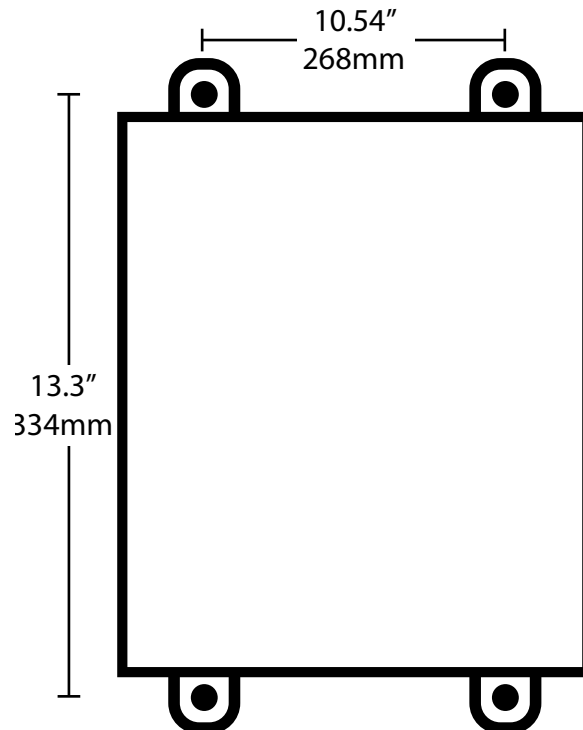


Figure 2: Sentinel mounting dimensions

## TURNING THE UNIT ON

To power-up the system, plug-in the power supply and turn-on the power switch on the front of the Sentinel.

## TURNING THE UNIT OFF

To power-down the system, turn-off the power switch on the front of the Sentinel, unplug the power supply, and then briefly press the OFF button on the Cellular Battery Backup Controller. This will disconnect the battery backup system and the unit will shutdown.



## POWER SUPPLY

The unit comes with an external 12VDC 2A power supply that accepts 100-240VAC 50/60Hz. The power supply has been prewired to the Cellular Battery Backup Controller located inside the enclosure. This controller distributes power to the Sentinel, the cellular modem, and also controls the battery backup system for the cellular modem. Note that the Sentinel has its own internal rechargeable battery.

## CELLULAR BATTERY BACKUP CONTROLLER

The Cellular Battery Backup Controller is the main power input for the system. It distributes power to the Sentinel Pro, the cellular modem, and controls the cellular battery backup system. There is no on/off switch for the controller, once power is applied it is functioning. Note that the modem also does not have a power switch so the modem will turn-on immediately as well. Only the Sentinel Pro has its own power switch.

## CELLULAR BATTERY BACKUP

There is a 12V 3AH rechargeable battery located below the Sentinel Pro which is used to power the cellular modem in the event of a power failure. The entire system should operate for about 8 hours when the batteries are fully charged. The 12V battery should last for 4-5 years before needing replacement depending on usage and operating temperature.

## SOLAR OPERATION

To operate the unit from a solar power system, disconnect the external power supply from the Vin terminals on the Cellular Battery Backup Controller. Next, connect the output of the solar voltage regulator to the Vin terminals. (See specifications for requirements)

## CONNECTING SENSORS

The Sentinel is compatible with a wide variety of sensors including normally open/normally closed contacts, 2.8K and 10K temperature sensors, and 4–20mA current sources. Compatible sensors and accessories are shown on the Sentinel website. Sensors may be connected while the device is powered on or off. A proper size screwdriver is provided for your convenience. Contact Sensaphone or your Sensaphone reseller for assistance in selecting sensors for your monitoring requirements. A list of sensors and accessories is shown in Appendix B. Follow the instructions below to properly wire and configure the inputs for each type of electrical signal.

**Warning:** The inputs are designed to work with low voltage signals. DO NOT connect voltages greater than 3.3V to the inputs. DO NOT connect 120VAC to the inputs.

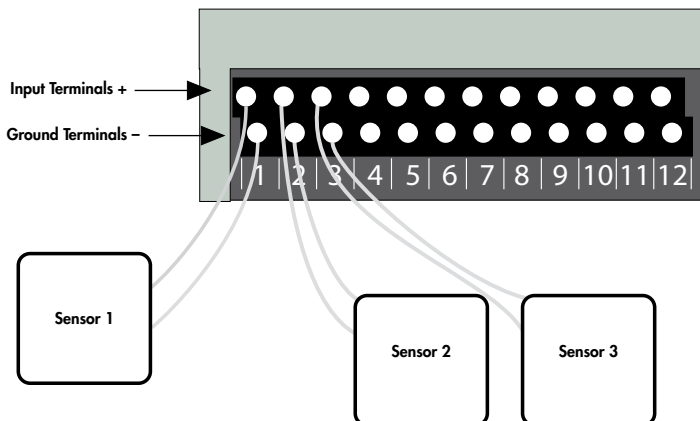
## GENERAL WIRING CONSIDERATIONS

Most dry contact sensors can be connected to the Sentinel using inexpensive 2-conductor twisted-pair cable as small as #24 AWG. For temperature and 4–20mA sensors, use the wire chart below as a reference for selecting the appropriate wire gauge. Note that if the sensor is located far from the unit or if you are running cable in an electrically noisy environment, you should seriously consider using shielded cable. This will shield the signal from electrical interference, thereby preventing false readings and/or damage to the unit. For your convenience, Sensaphone has 22 gauge shielded cable available in 50' lengths (part number FGD-0010). To minimize electrical noise coupling between sensor wires and other wiring, follow the guidelines listed below:

- Route the power supply and network cables to the unit by a separate path than the wiring to the sensor inputs. Where paths must cross, their intersection should be perpendicular.
- Do not run sensor wiring and AC power in the same conduit.
- Segregate wiring by signal type. Bundle wiring with similar electrical characteristics together.
- If shielded cable is used, tie the shield to the input ground terminal.

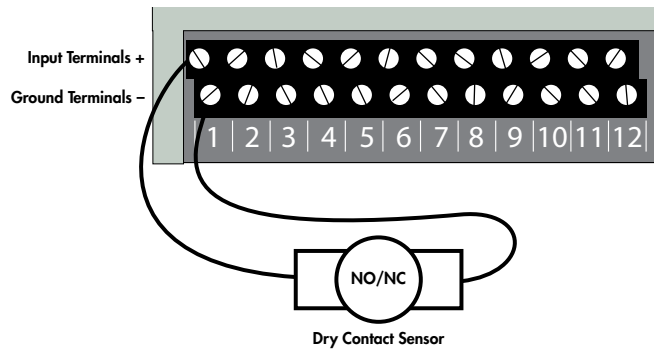
Wiring Distance	Minimum Wire Gauge
700'	#24 AWG
1500'	#22 AWG
2500'	#20 AWG

The zone terminal strip has an upper and lower level for connecting up to 12 sensors. The lower level terminals are all “ground” and are electrically connected together. The upper terminal strip is the positive connection for each sensor. See illustration below.



## NORMALLY OPEN / NORMALLY CLOSED DRY CONTACTS

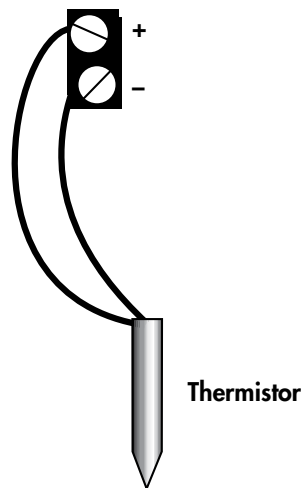
Dry contact sources consist of alarm relays or switches that are isolated and have no external voltage applied. These devices can be connected directly to the zone terminals without regard for polarity. Choose a zone and connect the wires to the corresponding screw terminals for that zone. The following figure shows how to connect a dry contact sensor:



Wiring a Dry Contact Sensor

## 2.8K/10K TEMPERATURE SENSORS

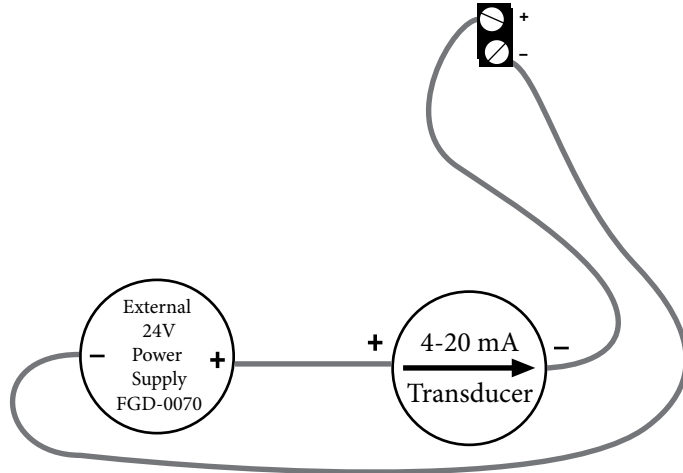
The Sentinel is compatible with 2.8K/10K temperature sensors that match the curve data listed in the tables in Appendix D. The monitoring temperature range of the 2.8K thermistor is -109 to 115°F (-85° to 57°C) and the 10K thermistor is -87° to 168°F (-66° to 76°C). Temperature sensors can be connected directly to the zone terminals without regard for polarity. Choose an alarm input and connect the wires to the corresponding screw terminals for that zone. 2.8K and 10K temperature sensors are available from Sensaphone. See Appendix B for part numbers. The figure below shows how to connect a temperature sensor:



Wiring a Temperature Sensor

## 4–20mA CURRENT LOOP TRANSDUCERS

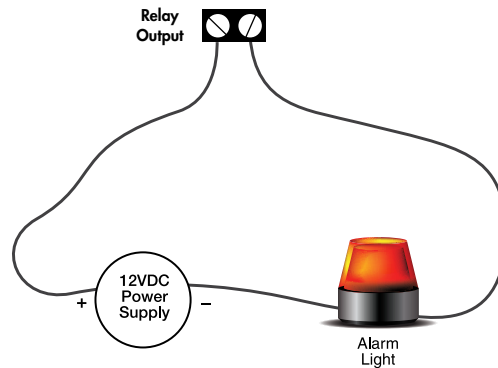
The inputs on the Sentinel are compatible with transducers that produce an analog output current of 4 to 20mA. Such transducers are available to measure tank and well levels, extreme temperatures, air pressure, water pressure, flow, voltage, current, rotational speed, etc. Contact our technical support department for assistance regarding your monitoring requirements (877-373-2700 or support@sensaphone.com). Follow the wiring diagrams below for connecting a 4–20mA device:



Wiring a 4–20mA device using an external 24 VDC supply.

## RELAY OUTPUT WIRING

The Sentinel includes a relay output (switch) that can be used to turn on a light, siren, or other device whenever an alarm occurs. The output is a normally–open (i.e. off) dry contact that can be used for low voltage switching. The relay is rated for up to 30VAC/VDC 1 Amp. A sample wiring diagram is shown below:



The relay can be controlled manually (via the website or App) or automatically based on specific inputs or alarms. See chapter 3 for details.



## BATTERY BACKUP

The Sentinel (in the white enclosure) has an internal rechargeable battery backup pack (part #BAT-0032) which will provide up to 8 hours of backup time in the event of a power failure. The unit will charge the battery and monitor its charge level. The percent charge can be viewed on the website. The Sentinel contains circuitry to protect the battery from deep discharge damage and will disconnect the battery when all of its available energy has been expended. The battery backup module should last 4 to 5 years.



To replace the battery pack, switch the power off, then remove the four screws on either side of the enclosure. The cover contains two switches with wires attached, carefully lift the cover off and move it out of the way without disconnecting any of the wires. Disconnect the battery connector with the red & black wires by pulling it out. Next, loosen the velcro strap and remove the battery pack. Install the new battery pack and secure the Velcro strap. Insert the battery connector into the circuit board (it doesn't matter which way you insert it). Carefully replace the cover making sure all of the leds pop through the holes, then replace the four screws.

## MEMORY/CLOCK BATTERY

The Sentinel (in the white enclosure) contains a CR2 lithium battery to backup certain values in SRAM memory as well as the real-time clock. This battery should last between 5-10 years depending on how much time the device is powered off.

{Note: Units manufactured prior to May 2016 contain a CR2032 lithium coin cell which has an estimated life of 2 - 5 yrs}.

## RESETTING THE SENTINEL TO FACTORY DEFAULT SETTINGS

In the event that you can no longer connect to your Sentinel, you can reset the unit to factory defaults. On the back of the unit is a small hole. Beneath the hole is a push button. Insert a paper clip or similar item into the hole and push the button for 5 seconds while the device is powered on. The Sentinel will erase all of its programming and then reboot automatically. Alternatively you can also reset the device to defaults from the Sensaphone.net website. Go to the Manage Devices page, under the Admin menu. Select the device, choose Reset to Default Values from the drop down, and click Submit.

# CHAPTER 2: SET UP

When your Sentinel “Online” LED is lit you can continue with the following website section.

1. Open an internet browser and go to [www.sensaphone.net](http://www.sensaphone.net).
2. Fill in the form to create a new account.



3. Once you are logged in, click *Admin*, then *Manage Devices*. In the “Add a Device” section, enter the Serial Number of your Sentinel and enter a device name. Click the *Add Device* button when finished.



Your Sentinel is now online with the Sensaphone.net website. Read the section below to learn how to view status and program your device.

## DESCRIPTION OF WEB PAGES

### DASHBOARD



The dashboard will list all of the devices on your account. This page is automatically updated with the most current information available.

The numbers at the top will show how many Unacknowledged Alarms, Current Alarms, Units Online, and Units Offline that currently exist for all devices on your account.

The map will show the location of any device on your account that has an address or GPS location listed. You can hover over the icon to see the device name and status. If the icon for the device is green, your device status is OK. If it is red, your device has alarms. You can click on the icon to show the zones for the selected device.

The device table will display all devices on your account. Click on the *Details* button to display and configure the zones for that device. You can also use the search box above the table to search through the table, or click on the table column headers to sort the data.

**Device Name** – The name of the device

**Status** – The current status of the device (Okay, Alarms, Offline, or Standby) If the device has any unacknowledged alarms, a symbol will be displayed in this column

**Power** – Displays if the device is On or Off (--- will display if the device is offline)

**Battery** – The current percentage of the device battery (--- will display if the device is offline)

**Last Response** – The time that the device last connected to the server

## STANDBY MODE

Standby mode puts the Sentinel in a temporary state such that no alarms will be detected, allowing onsite personnel to perform maintenance or other tasks that may have triggered an alarm otherwise. Standby mode can be entered using the Action drop down on the Dashboard page or via the pushbutton on the front of the unit. Standby mode will persist for the duration of time entered on the Device Configure screen and will automatically exit once the time expires. When using the pushbutton you must depress the button for 5 seconds. The Standby LED will light up to indicate that the device is in Standby mode. You can also exit Standby mode using the same methods.

**Standby** – Allows you to put the selected devices into Standby mode

**Enter** – Put the Sentinel in Standby mode for the length of time that is set on the Device Configure page

**Enter (Untimed)** – Put the Sentinel in Standby mode until you disable it

**Exit** – Take the device out of Standby mode

## DEVICE DETAILS

The device details page displays the sensor values for your Sentinel. This page is automatically updated with the most current information available. At the top of the page are buttons to access the *Configuration*, *Alarm Delivery* and *Logs*.

Zone	Type	Value	Status
Power	On	100	OK
Alarms	None	0	OK
High Ambient	Normally Open	100	OK
Power Test	4 Alarm	0 (24) sec	OK
Standby Test	10 Sec Timeout	10:00	OK
Standby Timeout	4 Alarm	0 (10) sec	OK
Standby Test	Normally Closed	100	OK
Low Voltage	4 Alarm	12.000 vdc	OK
RF	4 Alarm	0 dBm	OK
RF Interference	4 Alarm	0dB -20 units	OK
RF Noise	4 Alarm	0dB -20 units	OK
RF Signal	4 Alarm	0 dBm	OK
RF Test	Normally Open	100	OK
RF Test	Normally Open	100	OK

At the top of the page, you will see the device name, description, address and alarm status.

You will also see all of the zones for your device in the table.

**Zone** – The name of the zone

**Value** – The current value of the zone

**Status** – The current status of the zone

**Min/Max** – Displays the highest and lowest values recorded

## Sentinel Installation and Setup Guide

If the device has any unacknowledged alarms, a symbol will be displayed in the status column

The Action dropdown menu provides options that allow you to interact with your device, such as acknowledging alarms, resetting pulse count, runtime and min/max values, and putting the device into standby mode.

## CONFIGURE DEVICE

At the top of the dashboard, click *Configure Device* to go to the device and zone programming screens.

The box on the left will display all of your configureable zones, as well as Device (for general device settings), Power, Battery and Relay Output. As you select an option, the form on the right will change to display the appropriate data. Complete the address so that the Sentinel icon will be displayed at the appropriate location on the dashboard map. The gps coordinates will be automatically computed based on the address you enter after you click Save. If the computed coordinates are off you can override them by entering your own. To have the coordinates recompute based on the address you must delete them, then click Save again.

This page also contains settings for the *Device Offline* alarm and for *Standby Mode*. The *Device Offline* alarm will notify you if your devices stop communicating with the sensaphone.net servers for the programmed time duration. You can also receive a notification when the device comes back online by enabling the “Offline Return-To-Normal” option. You can create a custom list of people to be notified specifically for offline alarms by selecting the “Offline Alarm Delivery tab” at the top of this section and choosing Custom Alarm Delivery.

Once you have completed your programming, click on the *Save Settings* button at the bottom of the page.

The screenshot displays the 'Configure Device' web interface. On the left is a sidebar menu with options: Power, Battery, 1: High Alarm Level, 2: Flood Alarm, 3: Ambient Temperature, 4: Generator Fuel Level, 5: Security Door, 6: Leak Detector, 7: CO, 8: Standby Output, 9: Sp Contact Alarm, 10: Safety, 11: Turbidity, 12: Total Flow, and Output. The main content area is titled 'Sentinel Device' and 'Offline Alarm Delivery'. It shows device status as 'Okay' and 'Device Station'. Under 'Device Information', there are fields for Name (Sentinel Device), Description (Water Equipment System), and Address (Address Line 1: 8881 N Pezalla Rd, Address Line 2: Address Line 2, City: Chicago, State/Abbreviation: Illinois, Postal Code: 60614, Country: Country). GPS coordinates are listed as 41.81458 latitude and -87.71000 longitude. Under 'Device Settings', there are dropdowns for Standby Time (1 hour) and Offline Timeout (10 minutes), and a radio button for Offline Return To Normal (ENABLE). Under 'IP Settings', there is a checked checkbox for DHCP.

## Zone Programming

Select the zone you would like to configure from the box from the left. A sample screen for a temperature sensor is shown below.

## ZONE PARAMETER DEFINITIONS

**Enable/Disable:** This setting determines if the Zone is being used (Enabled) or not (Disabled). Selecting Disabled will remove the gauge from the Summary screen.

**Name:** Enter a name for the sensor you are monitoring which describes its purpose and/or location. The name will appear on the Device Details screen as well as on alarm messages.

**Type:** Choose the type of sensor you are connecting to the Zone input. For temperature sensors choose either degrees F or C.

**Units:** The Units field is used to describe the units of measure for the value being monitored. When Temperature is selected the Units field will automatically display F (Fahrenheit) or C (Celsius). When a 4-20mA type is selected you can enter the appropriate text for the monitored condition (e.g. %RH, PSI, GPM, RPM,...). When you select Normally Open (NO) or Normally Closed (NC) you can choose from several preset descriptions for the Open and Closed state of the input. The first word always describes the Open state of the contact and the second the Closed state. If you choose Custom you can enter your own text for the Open and Closed states. To do this simply type the words into the lower Units field and separate them with a slash (/). For example, "Slow/Fast", "Safe/Danger", "Dry/Wet".

**Calibration:** This field can be used to offset the Zone value either positive or negative if there is some error in the reading.

**Alarm Low:** This is used to determine the low level at which a temperature or 4-20mA Zone has reached the alarm threshold. The value must fall below the Alarm Limit to trip an alarm.

**Alarm High:** This is used to determine the high level at which a temperature or 4-20mA Zone has reached the alarm threshold. The value must exceed the Alarm Limit to trip an alarm.

**Table Low:** The Table Low value is used to define the lower range (4mA) of your 4-20mA sensor.

**Table High:** The Table High value is used to define the upper range (20mA) of your 4-20mA sensor.

**Alarm Delivery Enable/Disable:** When Enabled, alarm messages will be delivered, if set to Disabled alarm messages will not be delivered.

**Recognition Time:** This is the length of time that an alarm condition must be present before a valid alarm exists and message delivery is started.

## Sentinel Installation and Setup Guide

**Alarm Hold Time:** When an alarm occurs, the *Alarm Hold Time* will latch the alarm condition for the programmed time period, thus preventing redundant alarms from sending additional notification messages. This is useful for alarms that are likely to trip several times within a short time period, such as motion detectors.

**Return to Normal Enable/Disable:** This feature instructs the Sentinel to send a message when a zone input has changed from an alarm condition back to a normal condition. Anyone who received the original alarm message will also be sent the Return-to-Normal message.

**Auto Acknowledge Enable/Disable:** Enabling this option will automatically acknowledge an alarm when the zone goes back to normal. As a result, all remaining alarm notifications will be cancelled.

**Alarm Reset Enable/Disable:** This setting enables or disables the Alarm Reset Feature. The Alarm Reset feature is used to re-send alarm messages in the event that a fault condition is not corrected in a timely fashion. If an alarm continues to exist for the duration of the programmed Reset Time (see below) the alarm will reset (reactivate) and the alarm message delivery process will begin all over again. This is an optional feature.

**Alarm Reset Time:** This is the time allowed for an alarm's fault condition to be corrected before the Sentinel resets (reactivates) the alarm and begins the message delivery process all over again. It is recommended that this be set to no lower than 30 minutes to prevent numerous messages from being sent.

**Datalogging Mode:** The Sentinel has two modes of data logging for each zone: Continuous or While In Alarm. In Continuous mode the unit will log the value of the input on a fixed time interval all the time. The Normal Interval sets the logging rate while the value is within the normal range. The Alarm Interval sets the logging rate while the value is an alarm condition. By choosing the While In Alarm mode you can choose to have the unit only log values when it exceeds the alarm limits.

**Alarm Datalog Interval:** This is the interval that data will be logged while the input is beyond the programmed alarm limits. (Note: this is regardless of the programmed Alarm Recognition Time).

**Normal Datalog Interval:** This is the interval that data will be logged while the input is within the programmed alarm limits. To maximize the available memory for datalogging, set the Datalog Interval for each zone to multiples of each other. For example, Zone 1 can be set to 10 minutes, Zone 2 to 30 minutes, Zone 3 to 60 minutes, etc...

## MANAGE USERS

The sensaphone.net website allows you to set up users that will be linked to your account. Each user can be configured to have their own login for website access and/or be contacted for alarms. In addition, you can choose to give alarm acknowledgement capability to each user.

There are several levels of permissions that can be assigned to each user. You can also enter contact information for alarm delivery purposes. From the main menu, select *Users*, then *Manage Users*. To add a new user, click on the *Add User* button. The example below shows a user setup as an administrator with four contact destinations.

**User Details**

User Status:  Enable  Disable

User Access: ADMINISTRATOR

Alarm Delivery: Allow Acknowledgement

**User Information**

User Name: jim@factory

Address Line 1: 100 Oak Road

Address Line 2: Address Line 2

City: East Angles

State/Territories: CA

Postal Code: 90001

Country: USA

**Contact Details**

Description	Type	Destination	Enable	Schedule
Jim's Office	Phone	10000001234	Yes	Schedule Allow
Jim's Cell	Text	333 777 2222	Yes	Schedule Allow
Jim's Home	Phone	111 999 8888	Yes	Schedule Allow
Jim's Work Email	Email	jim@factory.com	Yes	Schedule Allow

**Login Details**

Email: jim@factory.com

Password: [Link Password]

The following defines the various permission levels:

**Administrator** – Full site access, all devices on your account

**Supervisor** – Gives the user access to the Dashboard, device-specific pages (for example, Device Details), Manage Users, and Manage User Groups, but for only the devices you choose for them (chosen under the Device Groups section of the form). Supervisors will have the ability to create new users, but they can only give the users Supervisor access or lower.

**User** – Gives the user access to the Dashboard, but only shows the devices you choose for them (chosen under the Device Groups section of the form)

**None** – No access to the website

**Alarm Delivery** – Choose whether you would like the user to be able to receive alarm notifications or not.

**Disabled** – No alarm delivery

**Inform Only** – User is notified about the alarm, but cannot acknowledge it

**Allow Acknowledgement** – User is notified about the alarm and is able to acknowledge it

## User Information

Next, enter details about this user. The user's name is the only required information.

## Contact Details

The 'Contact Details' section is where you enter the telephone numbers, text numbers, and email addresses to send alarm messages. {Note that phone calls and text messages require a Premium Ethernet subscription. Email alarm delivery is free}. See sample programming in the figure above. To add additional contacts click "Add Contact". Be sure to add all of your possible contact methods in this section. You can choose which ones get used on the Default Alarm Delivery Schedule or Zone Alarm Delivery Schedule.

## Telephone Number Programming

A '1' at the beginning of the telephone number is not required for calls to the USA, Canada, or other countries that are part of the North American Numbering Plan (NANP). See list below:

Countries in the North American Numbering Plan:

- United States
- Canada
- Caribbean Islands
  - Anguilla, Antigua & Barbuda, The Bahamas, Barbados, Bermuda, British Virgin Islands, Cayman Islands, Dominica, The Dominican Republic, Grenada, Jamaica, Montserrat, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Sint Maarten, Trinidad and Tobago, Turks & Caicos
- U.S. Territories
  - American Samoa, Guam, Northern Mariana Islands, Puerto Rico, U.S. Virgin Islands\*

\*Technically some of these are not in North America, but since they are part of the U.S., they use the U.S. telephone system.

**For all other countries** you have to enter an exit code first (+ or 011), then the country code, and then the number. Do not include trunk codes which are typically displayed as (0) near the beginning of the number.

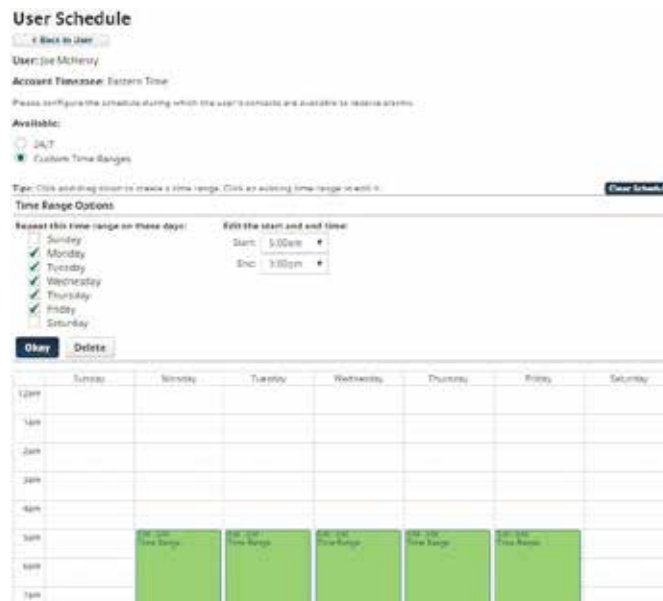
- For example, a call to the UK could be programmed as either:

+44 20 7950 4631

or

011 44 20 7950 4631

You can also create a time schedule to limit when you'll receive alarm messages. There is an overall *User Schedule* as well as individual Schedules for each contact. The default setting for all schedules is enabled, 24/7. In the sample screen below, the highlighted section shows the times when this user will be contacted for alarms:



\*Note that if you configure both a User Schedule and individual Contact Schedules, there must be overlap in order for alarm messages to be delivered.



## Login Details

Users will login with an email address and password. Enter this information in the *Login Details* section. In the event that a user forgets his/her password they can use the reset password feature on the main login page.

## Device Access

For accounts with multiple users and/or devices, you can choose to limit a user's access to selected devices. In the *Device Access* section, choose which units this User can access. See sample screen below:



Click on 'Save Changes' once you are finished.

## MANAGE USER GROUPS

Allows you to set up groups of users that can be used on other site pages.

Select the group you wish to edit from the dropdown menu, or select *Create New Group* to make a new group.

Make sure to give each group a unique, descriptive name so they can be easily referenced.

Click on the plus icon to add users to the group. A pop up modal window will show that will list all the alarm users you have added to your account from the Manage Users page (see that page description for more information).

You can select an entire user (all destinations listed under that user at the time of the alarm will be notified) or individual destinations of the user.

Click on the red X icon to remove that user from the group.

Once you are finished adding and removing users, click on the *Save Group* button at the bottom of the page.

## ALARM DELIVERY

The Alarm Delivery section is where you configure the people that will be contacted when an alarm occurs. You can setup a *Default Alarm Delivery Schedule* (i.e. contact list) for each device or you can create a separate *Zone Alarm Delivery Schedule* for each individual zone. A combination of both can also be used (e.g. some zones use the default schedule and others use a custom schedule). The first step is to configure your Users and Contacts as described in the *Manage Users* section. If you haven't completed that step please do it first.

### Default Alarm Delivery Schedule

To get started select a device from the Dashboard and click *Details*. Next click the *Default Alarm Delivery* button. Click the *Add Destination* button to select people from your User list. You can select all of the User contacts or just a few if desired. See sample screen below:



## Sentinel Installation and Setup Guide

Continue clicking the *Add Destination* button to add additional Users to the list. If you would like to insert a delay between the first User (or group of Users) and the next User, click the *Add Tier* button and enter the delay time. Users in this Tier will not be contacted until the delay time expires. Click *Save Changes* when your schedule is complete.

\*Note that the Tier Delay timer starts at the time the alarm occurs. If the alarm is acknowledged before the delay time expires then Users in the 2nd Tier (and beyond) will not receive the alarm message. See sample programming screen below:



### Zone Alarm Delivery Schedule

A Zone Alarm Delivery Schedule is an alarm contact list that only applies to one specific zone. You can create a separate Zone Alarm Delivery Schedule for each individual zone if required. To configure a *Zone Alarm Delivery Schedule* select a Zone from the *Device Details* page. Then click the *Zone Alarm Delivery* tab on the right. Select *Custom* to configure a contact list for the selected zone. Follow the steps as described above to complete the schedule.

### Quick-Add Destinations

Quick-Add Destinations are those that can be easily entered to the notification list without creating a User Account. Note, however, that destinations added here will be inform-only (e.g. **cannot acknowledge alarms**). This entry method is useful for sending messages to people who do not require a user account in the system but may want to be informed when a particular alarm occurs.

### Alarm Acknowledgment

Alarms can be acknowledged from the dashboard page by selecting a device using the checkboxes next to each device, and then clicking the "Action" drop-down at the top of the screen. You can acknowledge both Device Offline alarms or Zone alarms. Devices with 'Unacknowledged' alarms are identified with an exclamation point within a triangle. Once the alarm is acknowledged this symbol will disappear. You can acknowledge multiple alarms on multiple devices at the same time. Alarms can also be acknowledged during telephone calls by entering 555 when prompted, or by clicking the web link contained in email and text messages

## LOGS

The Sentinel includes an Alarm Log and Data Log. The Alarm Log lists all alarm activity for the selected device. You can narrow down the messages by individual zones or you can select multiple zones. The Data Log contains the recorded values for each zone based on the parameters you set up on the Zone Configuration screens. You can display the values on the screen as well as graph them. There is also an option to Save the data to a file. To get to the Device Logs section, click the *Details* button from the Dashboard for the device you would like to view, then click the *Device Logs* button.

**Alarm Log** – Shows the history of all alarm notifications that were sent for the device

**Data Log** – Show the history of all logged zone values and statuses for the device

**Export Data** - Allows you to save selected Alarm Log or Data Log records in either CSV or pdf format. Note that CSV formatted files can be opened in Microsoft Excel.



Note that for Normally Open and Normally Closed zone types, the Sentinel will record a “0” when the input is presented with an open circuit and a “1” when the input has a closed circuit. Depending on your sensor and programming, this may represent either a normal or alarm condition.

## DEVICE MANAGEMENT

You can add, modify, and remove Sentinel devices from your account on the Manage Devices screen. From the main menu select Admin, then Manage Devices. Listed below are the device-related actions that can be done.

**Adding Devices** - To add a new device to your account, enter the device serial number (located on the bottom of the unit in the format 00:07:F9:00:00:00) and give the device a name, then click *Add Device*.

**Reboot Device** - To reboot your device, select it from the list to the left and then choose Reboot Device from the drop down box at the bottom of the page, then click Submit. Your Sentinel will reboot and then reconnect within a few minutes. Your Sentinelgramming will remain intact.

**Remove From Account** - To remove a device from your account, select it from the list to the left and then choose Remove from Account from the drop-down box at the bottom of the page. Then click *Submit*.

**Reset to Default Values** - To reset a device to default settings, select it from the list to the left and then choose *Reset to Default Values* from the drop-down box at the bottom of the page. Then click *Submit*. Allow several minutes for your device to complete the reset process.

### Manage Devices

**Your Devices**

- Acme Wet Well Alarm - 00-07-F9-00-70-B1
- PHL Water Plant - 00-07-F9-00-71-88
- River Road Pump Station - 00-07-F9-00-71-80
- Valley Forge Booster Station - 00-07-F9-00-82-5D
- WasteWater Treatment Plant - 00-07-F9-00-82-F9

With Selected: Reset to Default Values

Submit

**Add a Device**

Serial Number

Device Name

Add Device

### DEVICE GROUPS

In cases where you have many devices and many users it may be desirable to create Device Groups. These can make it easier to assign device permissions to specified Users. From the main menu select Admin, then Device Groups. In the main window, you will see a list of all your devices and any groups you may have already created. Devices are shown with a green device icon and groups are shown with a black icon. You can have multiple groups, and you can even have groups within a group. If a device icon is lined up on the left-most side of the window, they are not in a group.

To add a new group, click on the Add Group button at the top of the page. A 'New Group' icon will appear in the list. You can rename the group by right clicking on it and selecting Rename. To move a device into a group, click on the device and drag it into the group. Continue adding devices until you're finished, then click Save Groups.

The blue number shown on the group icon shows how many devices are within that group. To remove a group, right click on the group and select Delete. Any devices in that group will be moved up one level. For example, if a group that had two devices was deleted, the two devices would be shifted to the left and would no longer be in any group. You can also click and drag a device or group to reorder them. To search through your devices click on Filters. You can choose to hide any device or group that does not match your search, and you can choose to only search through your devices and not your groups. Once you are finished editing your groups, click on the Save Groups button at the bottom of the page.

### ACCOUNT SETTINGS

The Account settings page is used to configure a number of options that apply across the board to your account. This page is only available to users with 'Admin' site access level. To access the account page select 'Admin' from the main menu, then 'Account'.

**NAME:** Give your account a 'Name' that best describes the organization managing your devices.

**TIME ZONE:** Set the 'Time Zone', which will serve as the default for all of your users. This will be important to ensure that any schedules you configure will operate at the appropriate times.

There are several 'Account Features' that you can configure to have the system operate in a certain manner.

**REQUIRE SITE USER:** When Admins and Supervisors are configuring Users, you can force the system to require that all User's receive website access by checking the 'Require Site User' box.

**REQUIRE ALARM USER:** Similarly, you can also require all Users to have the ability to receive alarm notifications by checking the 'Require Alarm User' box.

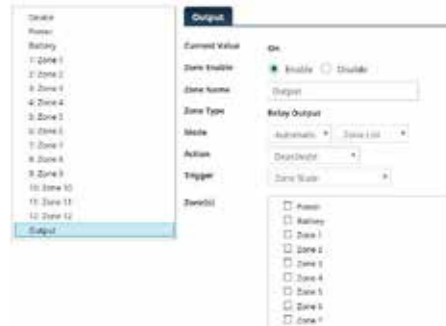
**USER GROUPS:** You can choose whether or not to allow 'User Groups' to be created within the system. Check the 'User Groups' check box to permit user groups to be used within the system.

**HIDE DISABLED ALARMS:** On the device details page you choose to hide the alarm status of a zone if 'Alarm Delivery' is set to disabled for the selected zone. This can be convenient when a zone is beyond the alarm limits for maintenance reasons and you don't want to display the status as 'Alarm'.

**CSV Email:** Enabling this setting exposes an option on the User pages to use the CSV email message format used by some state department of environmental protection agencies (such as the MASS DEP). Note that enabling this option will expose a similar setting on the User pages so that you can create a specific user with a specific email address to receive the specially formatted message.

# CHAPTER 3: CONFIGURING THE RELAY OUTPUT

The Sentinel includes a relay output that can be used to control a light, siren, or other low voltage device. The output can be configured to switch either manually or automatically when a zone changes state or exceeds the alarm limits. To program the output click *Output* from the *Device Details* or *Configure Device* screen. The following configuration page will appear:



Enter a Name so that you'll know what the Output will be controlling. The Output can operate in Manual mode or Automatic mode. In manual mode you can turn the relay ON or OFF through the web page or the mobile App. To manually switch the relay output, click in the State field and select either ON or OFF, then click *Save Changes*. The change request will be sent to the Sentinel and the *Current Value* will update after the output change has successfully completed.

In Automatic mode the relay can be programmed to turn-on automatically when certain conditions are met. Listed below is a description of the parameters that apply to the automatic modes.

**Input Selection** - Next to the Automatic mode selection box is another drop-down that allows you to select which zones will control the output. There are four options (Zone List, Type List, All Inputs, and Limit: Zones).

**Zone List:** This option allows you to individually select which zones will cause the output to switch. Check the boxes next to the desired zones.

**Type List:** This option allows you select zones based on the zone Type. For example, you could have all of the zones configured for Temperature control the output.

**All Inputs:** This option selects all of the inputs (zones).

**Limit: Zones:** This option allows you to independently control the output based on the value of one or two zones using greater-than, less-than, or equal-to comparison statements. A separate Output-On and Output-Off instruction can be configured with its own comparison value. See sample below:



**Action** - This setting determines what the Output will do when the selected zone (or zones) exceeds the alarm limits. You can have the relay Activate (turn-on), Deactivate (turn-off), or Cycle (ON under normal conditions, momentarily OFF for 10 seconds when an alarm condition occurs, then back ON).

**Trigger** - The trigger determines what will cause the output to change state. There are 3 options to choose from which are described below:

## Sentinel Installation and Setup Guide

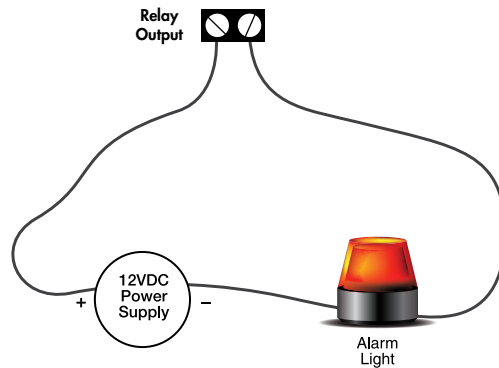
**Unacknowledged Alarms:** Choosing this option will make the Output change to the setting defined by the Action for as long as an Unacknowledged Alarm persists on the selected zones. Once the alarm is acknowledged the Output will revert back to its normal position.

**Alarm Condition:** Choosing this option will make the Output change to the setting defined by the Action for as long as the selected input(s) remain in Alarm, regardless of acknowledgement. Once the selected zones return to their normal state the Output will revert back to its normal position.

**Zone State:** Choosing this option will make the output change to the setting defined by the Action as soon as the selected zones exceed the alarm limits. In other words, the alarm recognition time is not enforced, and the Output will change instantly. Once the selected zones return to their normal state the Output will revert back to its normal position.

### Relay Output Wiring

The relay output can be used to turn on a light, siren, or other low voltage device. The relay is rated for up to 30VAC/VDC 1 Amp. A sample wiring diagram is shown below:



# APPENDIX A: WEEKLY TESTING PROCEDURE

We recommend that you test your Sensaphone weekly to be sure it is functioning properly. This will ensure that when a problem arises the Sensaphone will be ready to alert the appropriate personnel.

There are several tests that can be performed:

- 1.) Create an alarm on each zone by tripping all connected sensors.

**Temperature sensors:** Heat or cool the sensor.

**Motion sensors:** Have someone walk in front of the sensor.

**Door/window sensors:** open the door/window.

**Water sensors:** Apply a small amount of water beneath the sensor or use a wet towel and touch it to the sensor probes.

**Humidity sensors:** Raise the humidity around the sensor by holding a cup of very hot water beneath the sensor.

- 2.) Allow the unit to contact all programmed users. This will make sure that the Sensaphone is programmed properly. It will also prepare personnel to respond appropriately when they receive a message from the Sensaphone.

- 3.) Test the battery (if installed) by unplugging the AC adapter and making sure that the Sensaphone continues to function. Keep the AC adapter unplugged so that a Power Failure alarm occurs. Plug in the AC adapter after the unit has finished.

- 4.) Keep a log of your tests, noting the date and whether the Sentinel passed in each category tested. An example of such a log is shown below. (See “Test Log” at the end of this manual.)

WEB600 Test Log							
Date	Inputs		Alarm		Battery		
07/19/09	Pass <input checked="" type="checkbox"/>	Fail <input type="checkbox"/>	Pass <input checked="" type="checkbox"/>	Fail <input type="checkbox"/>	Pass <input checked="" type="checkbox"/>	Fail <input type="checkbox"/>	Bob H
08/20/09	Pass <input checked="" type="checkbox"/>	Fail <input type="checkbox"/>	Pass <input checked="" type="checkbox"/>	Fail <input type="checkbox"/>	Pass <input checked="" type="checkbox"/>	Fail <input type="checkbox"/>	Alex G.
09/19/09	Pass <input checked="" type="checkbox"/>	Fail <input type="checkbox"/>	Pass <input checked="" type="checkbox"/>	Fail <input type="checkbox"/>	Pass <input checked="" type="checkbox"/>	Fail <input type="checkbox"/>	Bob H.
	Pass <input type="checkbox"/>	Fail <input type="checkbox"/>	Pass <input type="checkbox"/>	Fail <input type="checkbox"/>	Pass <input type="checkbox"/>	Fail <input type="checkbox"/>	
	Pass <input type="checkbox"/>	Fail <input type="checkbox"/>	Pass <input type="checkbox"/>	Fail <input type="checkbox"/>	Pass <input type="checkbox"/>	Fail <input type="checkbox"/>	

If you require assistance, call Sensaphone Technical Support at 610-558-2700.

# APPENDIX B: ACCESSORIES

The sensors listed below are available from Sensaphone, and represent the most commonly used zone devices. Other dry contact sensors, designed for more specialized applications, may also be used. Commercial or industrial electrical supply houses can provide devices to monitor virtually any condition. For further information, contact Sensaphone Customer Service at 610-558-2700.

Part #	Description	Part #	Sensor/Switch
BAT-0032	Sentinel Battery	FGD-0100	2.8k Remote Temperature Sensor
FGD-0006	Magnetic Reed Switch	FGD-0101	2.8k Weatherproof Temperature Probe
FGD-0007	Passive Infra-Red Detector	FGD-0102	10k Weatherproof Temperature Probe
FGD-0010	50' two-conductor #22AWG shielded Cable	FGD-0103	10k Indoor Decorator
FGD-0013	Spot Water Detector	FGD-0104	10k Outdoor Air Weatherproof
FGD-0022	Temp° Alert	FGD-0301	Pressure Sensor
FGD-0027	Humidistat	FGD-0303	Vibration Sensor
FGD-0049	Smoke Detector with Built-in Relay		
FGD-0052	Humidity 4-20mA Transmitter		
FGD-0053	24VDC Power Supply		
FGD-0054	Power-Out Alert		
FGD-0056	Zone Water Detector w/Water Rope		
FGD-0063	Additional 10' Water Rope for FGD-0056		
FGD-0065	Carbon Monoxide Sensor		
FGD-0066	Air Quality Sensor		
FGD-0067	Surge Suppressor		
FGD-0070	Power supply with battery backup		



# APPENDIX C: SPECIFICATIONS

## ALERT ZONES

Number of Zones: 12

Zone Connector: terminal block

Zone Types: N.O./N.C. contact, 2.8K Thermistor ( -109° to 115°F, -85° to 57°C ) And 10K Thermistor (-87° to 168°F; -66° to 76°C), and 4-20mA (-80,000.0 to 80,000.0

Zone Characteristics: 28.7KΩ to 3.3V (temperature/contact) or 250 Ohms to ground (4-20mA)

A/D Converter Resolution: 12 bits ±2 LSB

Zone Protection: 5.5VDC Metal Oxide Varistor with fast acting diode clamps.

Pulse Counting: 1ms minimum duration, 1 pulse-per-second maximum rate

## RELAY OUTPUT

Rated for 1A 30VAC/ 1A 30VDC Maximum

## DATA LOGGING

1 minute to 24 hour sampling rate

User programmable channel selection

Zones 1 – 12

Battery

Input Power

## LED INDICATORS

Power: On steady when the unit is powered on.

Alarm: Off when no alarm exists.

Ethernet Link and Activity LEDs

Online

Standby

## COMMUNICATION TYPE:

4G/LTE Cellular via AT&T, Verizon, or Rogers

## POWER SUPPLY

Power Supply: 120VAC/12VDC 50/60Hz 30W wall plug-in transformer w/6' cord.

Power Consumption: 15 Watts

Power Protection: Metal Oxide Varistor

## **BATTERY BACKUP**

Rechargeable Battery: Internal 8 Hr NiMH Battery Pack (Part # BAT-0032)

Memory/Clock Battery: Internal 5-10 yr CR2 lithium (Part # BAT-0033)

Cellular Battery: 3AH SLA Battery (BAT-0005)

## **ENVIRONMENTAL**

Operating Temperature: 32–122° F (0–50° C)

Operating Humidity: 0–90% RH non-condensing

Storage Temperature: 32°–140° F (0–60° C)

## **PHYSICAL**

Enclosure: High impact polycarbonate, UL Type 4X (IP66)

Physical Dimensions: 14" x 12" x 7.4" (356 mm x 305 mm x 188 mm)

Weight: 14 lb. (6.35 kg)

# APPENDIX D: THERMISTORS

## 2.8K THERMISTOR DATA

Degrees Celsius	Resistance (Ohms)
-50	187,625
-40	94,206
-30	49,549
-20	27,180
-10	15,491
0	9,142
10	5,572
20	3,498
30	2,256
40	1,491
50	1,009
60	697
70	490
80	351

## 10K THERMISTOR DATA

Degrees Celsius	Resistance (Ohms)
-50	441.3K
-40	239.8K
-30	135.2K
-20	78.91K
-10	47.54K
0	29.49K
10	18.79K
20	12.25K
30	8,194K
40	5,592
50	3,893
60	2,760
70	1,990
80	1,458
90	1,084
100	816.8
120	481.8
130	376.4
140	297.2
150	237.0

# APPENDIX E: POST & CONNECTION ERROR CODES

When the device boots up it runs a Power On Self Test (e.g. POST). During this process the Online LED will go through a series of blink patterns. This can take a few minutes while it tests various functions and connects to the Sensaphone.net servers. If a problem occurs, the Online LED will blink a repetitive pattern of 'x' blinks followed by a 5 second pause. The table below defines the possible errors based on the number led of blinks.

Online LED Blink Codes	Failure indication	Description	Corrective Action?
OFF	Idle	Unit does not have a secure connection to the server, nor attempting to establish a secure connection	"Unit is initializing, either on power-up or rebooting. Most of the initial boot time is spent initializing memory, which can take a few minutes. * If the power LED is also OFF, the unit may have its power cable disconnected and its internal battery is depleted. * A less likely possibility is the online LED is disconnected or faulty."
flickering	Negotiating	Unit is negotiating a secure connection	The online LED flickering or blinking irregularly is normal when the unit is negotiating the secure connection. In contrast, the error code blinks steadily, then has a 5 second OFF period between error blinks.
ON	Connected	Unit has established a secure connection with the server	Secure connection with the server is established – OK!
1	Operating system initialization in progress	The unit's operating system's I/O is initializing	There is a fault in the firmware if this error code persists.
2	Real-time clock initialization failed	Internal clock not functioning	Possibly a hardware fault with the processor's internal RAM or RTC oscillator failure
3	Ethernet device initialization failed	Failed to configure ethernet chip	Probably a hardware fault.
4	Ethernet cable failed	Ethernet cable appears to be disconnected during boot	The Ethernet cable may be disconnected or otherwise faulty
5	DHCP failed	Unable to bind IP address	If using static IP, there may be an error in the IP, DNS, gateway or netmask. If using DHCP, problem may be with DHCP server.
6	Secure negotiation in progress	The unit's operating system's I/O has finished initializing, will now proceed with the secure connection negotiation	"There is a fault in program execution if this error code occurs, perhaps the memory has been corrupted. * A less likely possibility is the processor's internal RAM is faulty."
7	DNS link failed	DNS link failed	"DNS address may be incorrect, or perhaps the DNS server is down. Also check the Ethernet cable: if disconnected while securely connected to the server, reconnection attempts while the cable is disconnected will fail here."
8	IP address failed	IP address could not be resolved	If using static IP, the IP address may be incorrect
9	TCP socket failed	TCP socket to the secure server failed to connect	Port 443 may be blocked. Or perhaps the remote server is unavailable – this is the first attempt at connecting with the remote server. Will attempt to reconnect to another server.
10	SSL connect failed	SSL connection to the secure server failed to connect	Server may have SSL disabled?
11	SSL handshake failed	SSL handshake failed	If this keeps happening, the problem may be the server has changed its SSL certificate.

## Appendix E: POST & Connection Error Codes

12	Server dropped the connection	The server dropped the established secure connection for some reason	Probably a glitch. Unit will reestablish the secure connection in a minute. (This is the catch-all error code for the server dropping the connection – there are many possible reasons).
13	SSL invalid MAC	The server dropped the established secure connection due to an invalid MAC	Probably a glitch, unit will reestablish the secure connection in a minute.
14	TCP read error	The server dropped the established secure connection due to a read error	Probably a glitch. Unit will reestablish the secure connection in a minute. If this keeps occurring, the server may be restarting/rebooting and may take about 8 minutes to reconnect.
15	Ethernet cable disconnected	The Ethernet cable disconnected or failed while the secure connection was established	Reconnect or replace the Ethernet cable
16	Reserved		
17	TCP write error	The unit had a problem transmitting over Ethernet	Probably a glitch. Unit will reestablish the secure connection in a minute. If this keeps occurring, there may be a problem with the real-time clock getting stuck - check if the lithium battery is below 30% (2.3V; nominal voltage is 3.0V).
18	TCP socket closed	The TCP socket between the unit and the server is unexpectedly closed.	Unit will reboot if this error occurs 6 times, which may clear the problem. Manual reboot would be the equivalent.
19	HTTP JSON parse error	The JSON message from the server is garbled or not present	Corrupt data communication. If a cellular or satellite connection, check for weak signal

# APPENDIX F: RETURNING THE UNIT FOR REPAIR

In the event that the Sentinel does not function properly, we suggest that you do the following:

- 1) Record your observations regarding the Sentinel's malfunction.
- 2) Call the Technical Service Department at 610-558-2700 prior to sending the unit to Sensaphone for repair.

If the unit must be sent to Sensaphone for Servicing, please do the following:

- 1) Unplug the AC power supply from the wall outlet and disconnect all sensors from the alert zones.
- 2) Carefully pack the unit to avoid damage in transit. Use the original container (if available) or a sturdy shipping box.
- 3) You must include the following information to avoid shipping delays:
  - a) Your name, address and telephone number.
  - b) A note explaining the problem.
- 4) Ship your package to the address below:

SERVICE DEPARTMENT

SENSAPHONE

901 Tryens Road

Aston, PA 19014

- 5) Ship prepaid and insured via UPS or US Mail to ensure a traceable shipment with recourse for damage or replacement.



