Digital Microwave System 915 Addendum

The RF Transmitter/Receiver Board was redesigned because some components on the board were no longer available. This addendum contains the tuning procedure and service information for the new board.

EADC12WC DMS Concealed 12'
EADC18WC DMS Concealed 18'
EADC24WC DMS Concealed 24'
EADM06 DMS Micromax 6'
EADM06WC DMS Micromax WC 6'
EADM12 DMS Micromax 12'
EADM12WC DMS Micromax WC 12'
EADM18 DMS Micromax 18'
EADM18WC DMS Micromax WC 18'
EADM24 DMS Micromax 24'
EADP06 DMS Pedestal 6'
EADP18WC DMS Pedestal WC 18'
EADR03WC DMS Sensormat II 3'
EADR06WC DMS Sensormat II 6'
EADR10WC DMS Sensormat II 10'
EADS03 DMS Slimline 3'
EADS06 DMS Slimline 6'

Note to Installers:
For FCC compliance, system components must be located where persons are not likely to linger within 20cm (8") of the RF antennas. A 20cm (8") setback is not required provided the antenna location does not promote lingering within 20cm (8") of the antennas. For example, do not locate antennas adjacent to a chair or bench.

Contents

About this Guide

This Setup and Service guide explains board replacement, an antenna connection change, tuning, and typical installations for the DMS 915 detector with the redesigned RF Transmitter/ Receiver Board. It is intended to be used as a supplement to the DMS 915 Installation and Field Service Manual, 8000-0395-01. Refer to the DMS 915 manual for a complete description of theory, installation, and trouble-shooting.

Note: Because customer requirements dictate the placement of detector components, your Sensormatic representative will supply this information separately.

If you need assistance...

Call Sensormatic Customer Support at:

1-800-543-9740

(DOJ) 01/01

About the DMS 915

The Digital MicroWave System (DMS) 915 is a microcontroller-based anti-theft system. The DMS 915 produces an alarm when it detects a Sensormatic tag, a packaged semiconductor diode.

To detect the tag, the system performs the following operations:

- The system generates a “zone of protection,” typically at a store exit. This zone consists of two overlapping fields. The first field is a static or frequency-hopping, frequency modulated RF signal. The second field is a frequency shift key (FSK) modulated and predominately electrostatic field called an E-field.
- When a tag enters the zone, it combines the RF signal and the E-field into a composite signal that radiates to the system RF antennas. The system detects the composite signal, separates the modulation, and compares the recovered modulation to the modulation transmitted. If the two signals match, the system issues an alarm.

The DMS 915 is programmed using an external hand-held computer. Programmable features include RF hopping bank or frequency selection, RF power level selection, electrostatic field frequency selection, “tag-too-close” function enable/disable, alarm tone selection, alarm duration selection, selectable hits required for alarm, and alarm count set/reset control.

System Components

DMS 915 components include E-field radiators, RF antennas, remote alarms, and a programmable power pack

Three types of E-field radiators are:

- Wire cloth – usually recessed in the floor or sometimes laid on the floor under a rubber pad.
- Plate – a metal plate concealed inside a pedestal at the side of the exit.
- Vortex – a long aluminum bar hung across the exit.

The RF antennas are used to radiate the frequency-hopping, frequency-modulated RF signal. These antennas mount in a variety of ways. They can be concealed above the ceiling, mounted in pods, concealed in the floor, or mounted in pedestal enclosures located at the store exit.

The remote alarm provides a audio/visual signal that a tag has entered the “zone of protection.”

The power pack powers and controls the system. The pack is typically concealed inside an enclosure.

Board Replacement

The new RF Transmitter/Receiver Board (0300-2469-01) is not compatible with the old Processor Board (0300-0928-01). If the old RF Transmitter/Receiver Board (0300-0385-01) is replaced with a new RF Transmitter/Receiver board, the old Processor Board also must be replaced with Processor Board 0300-0928-02.

Antenna Connection Change

Connect the Impedance Matching Filter (SEC p/n 0400-1379-01) to the outer RF port (farthest from the IF module). Refer to Figure 1.

Connect one of the RF antennas to the filter.

Connect the other RF antenna directly to the remaining RF port.

Tuning Procedure

The DMS 915 has been pre-tuned at the factory. If the detector is performing satisfactorily, no tuning is required.

To tune the detector, do the following:

1. **Using the laptop configurator or Psion programmer, program the Power Pack to the following settings:**

E Generator Frequency	- 111.5kHz
System Type	- 915
RF Power	- 10
Select RF Bank	- 903-905
Alarm Settings	- n/a
Number of Hits	- 1
Tag Too Close	- On
RF Frequency	- 904.2
RF Modulation	- Off

2. **Connect the oscilloscope probe to the "Recovered Modulation Monitor" test point located in the IF Module (Figure 1). Set the vertical sensitivity to 1Volt/division and the time base to 0.5 millisecond/division.**

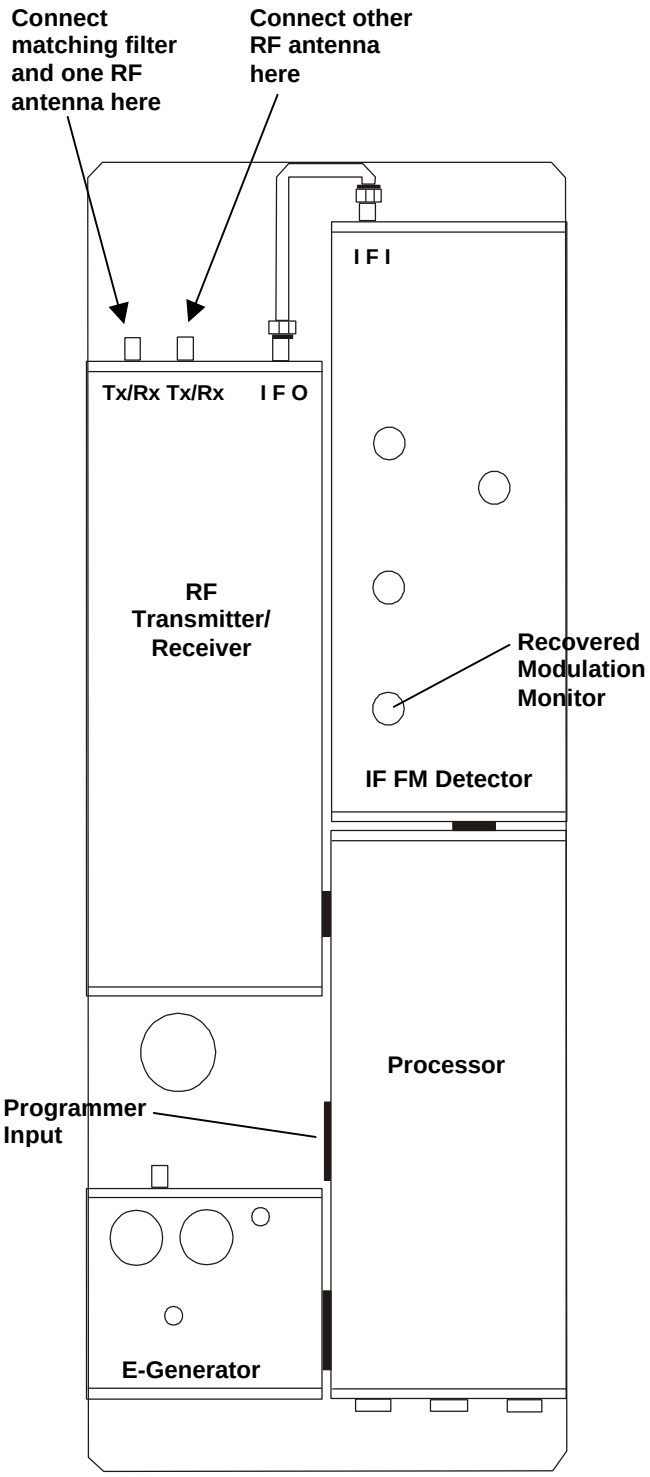
3. **Move a tag around in the field and change its orientation until a signal of two volts peak to peak is observed on the scope. If necessary, the amplitude of the E-Field Generator can be adjusted to achieve this value.**

4. **Adjust the variable capacitor on the antenna side of the Impedance Matching Filter until the signal on the scope is at a maximum. Adjust the variable capacitor on the power pack side of the filter to further maximize the signal amplitude. Repeat this adjustment sequence of the capacitors until the signal reaches its maximum peak value.**

   Note: If the amplitude of the signal exceeds four volts peak to peak at any time during this adjustment, turn the E-Field amplitude down to two volts peak to peak to prevent saturation of the amplifiers and consequently false readings.

5. **Using the configurator, reset the System Type to "915HOP" after tuning has been completed.**

Figure 1. DMS Power Pack



Typical Installations

DMS 915 components are arranged in various configurations depending on the application.

Typical installations are:

- Slimline with plates
- Concealed ceramic RF antennas with wire cloth
- Pedestal with plates
- Pedestal with wire cloth
- Pedestal with vortex
- Micromax plastic RF antenna with vortex
- Micromax plastic RF antenna with wire cloth
- Sensormat II with wire cloth

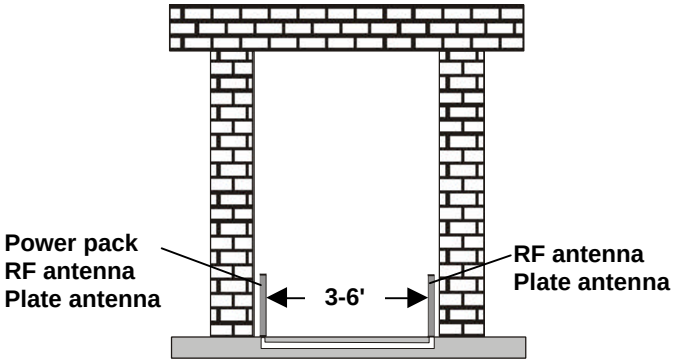
Slimline with Plates

The Slimline with plate system consists of two dish type RF antennas, each mounted on metal frames which are enclosed in non-metallic pedestals. A transmitter/receiver power pack, RF antenna, and an electrostatic field radiator plate are contained in one unit while the other pedestal has only an RF antenna and another electrostatic radiator plate. The housings are faced toward each other at a typical distance range from 3 to 6 feet depending upon the installation. The antennas are connected to the transmitter/receiver via shielded coaxial cables.

Components:

- Power Pack
- RF antenna (dish)
- Electrostatic field Slimline plate antenna
- Metal Mounting Frame
- Typical Cosmetic Enclosure – Old
- Typical Cosmetic Enclosure - New

Figure 2. Slimline with plates



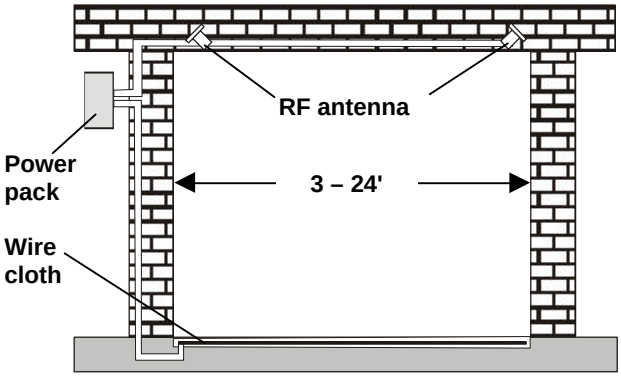
Concealed Ceramic RF Antennas with wire cloth

The Concealed ceramic RF antennas with wire cloth system consists of two helix type RF antennas, each resting on the ceiling tiles. The RF antennas are faced towards each other at a typical distance range from 3 to 24 feet depending upon the installation. On the floor between the RF antennas lays an electrostatic radiator, a wire cloth whose length is less than the separation between the RF antennas. The wire cloth is usually recessed in the floor or sometimes placed on the floor and covered with a rubber mat. The antennas are connected to the transmitter/receiver power pack via shielded coaxial cables. The transmitter/receiver power pack has an optional cosmetic enclosure.

Components:

- Power Pack
- RF antenna (helix)
- Electrostatic field wire cloth antenna
- Typical cosmetic mounting enclosure

Figure 3. Concealed antennas with wire cloth



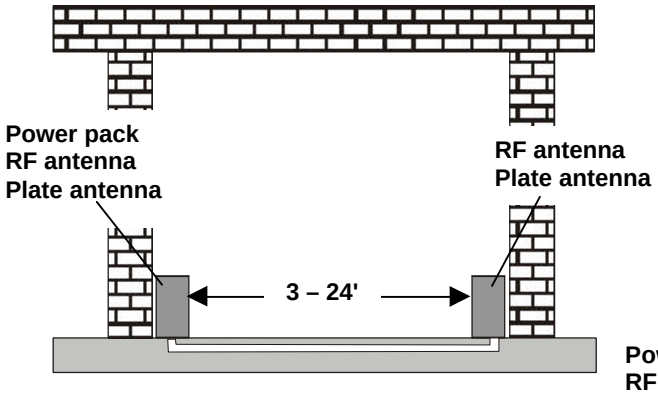
Pedestal with Plates

The Pedestal with plate system consists of two plastic helix type RF antennas, each mounted and enclosed in pedestals. A transmitter/ receiver power pack, RF antenna, and an electrostatic field radiator plate are contained in one unit while the other pedestal has only an RF antenna and an electrostatic field radiator plate. The housings are faced toward each other at a typical distance range from 3 to 24 feet depending upon the installation. The antennas are connected to the transmitter/receiver via shielded coaxial cables.

Components:

- Power Pack
- RF antenna (helix)
- Electrostatic field plate antenna
- Cosmetic Mounting Enclosure

Figure 4. Pedestal with plates



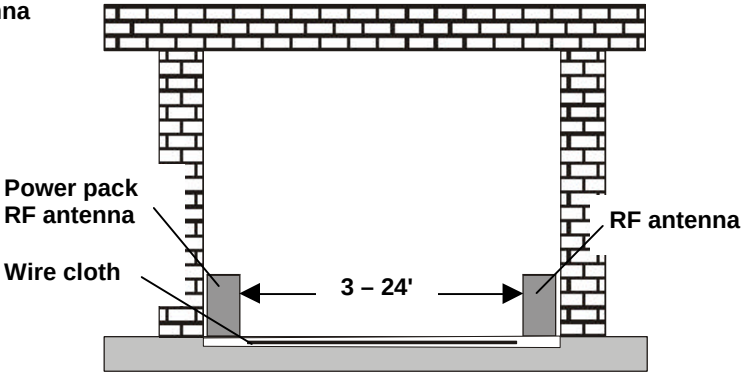
Pedestal with Wire Cloth

The Pedestal with wire cloth system consists of two plastic helix type RF antennas, each mounted and enclosed in pedestals. A transmitter/receiver power pack and RF antenna are contained in one unit while the other pedestal has only an RF antenna. The housings are faced toward each other at a typical distance range from 3 to 24 feet depending upon the installation. Between the housings lays the electrostatic radiator, a wire cloth antenna at a length less than the pedestal separation. The wire cloth is usually recessed in the floor or sometimes laid on the floor and covered with a rubber mat. The antennas are connected to the transmitter/receiver power pack via shielded coaxial cables.

Components:

- Power Pack
- RF antenna (helix)
- Electrostatic field wire cloth antenna
- Rubber Mat
- Cosmetic Mounting Enclosure

Figure 5. Pedestal with wire cloth



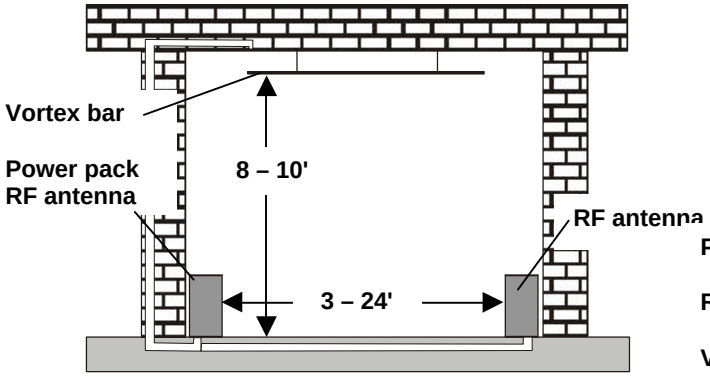
Pedestal with Vortex

The Pedestal with vortex system consists of two plastic helix type RF antennas, each mounted and enclosed in pedestals. A transmitter/ receiver power pack and RF antenna are contained in one unit while the other pedestal has only an RF antenna. The housings are faced toward each other at a typical distance range from 3 to 24 feet depending upon the installation. In between the housings is an electrostatic radiator, a vortex bar antenna which is suspended from the ceiling at an elevation between 8 and 10 feet. Its length is less than the pedestal separation. The antennas are connected to the transmitter/receiver power pack via shielded coaxial cables.

Components:

- Power Pack
- RF antenna (helix)
- Electrostatic field vortex bar antenna
- Non-metallic Mounting Enclosure

Figure 6. Pedestal with vortex



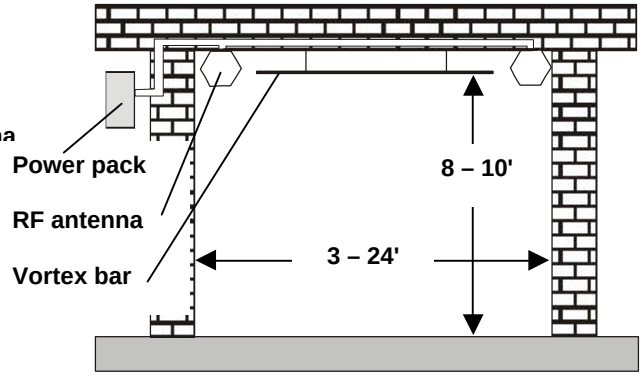
Micromax Plastic RF Antenna with Vortex

The Micromax with vortex system consists of two plastic helix type RF antennas, each mounted and enclosed in plastic housing pods suspended from the ceiling or mounted to the floor. The housings are faced toward each other at a typical distance range from 3 to 24 feet depending upon the installation. In between the housings is an electrostatic radiator, a vortex bar antenna suspended from the ceiling at an elevation between 8 and 10 feet. Its length is less than the Pod separation. The antennas are connected to the transmitter/receiver power pack via shielded coaxial cables. The transmitter/receiver power pack has an optional cosmetic enclosure.

Components:

- Power Pack
- RF antenna (helix)
- RF antenna pod
- Electrostatic field vortex bar antenna
- Typical cosmetic mounting enclosure

Figure 7. Micromax with vortex



Micromax Plastic RF Antenna with Wire Cloth

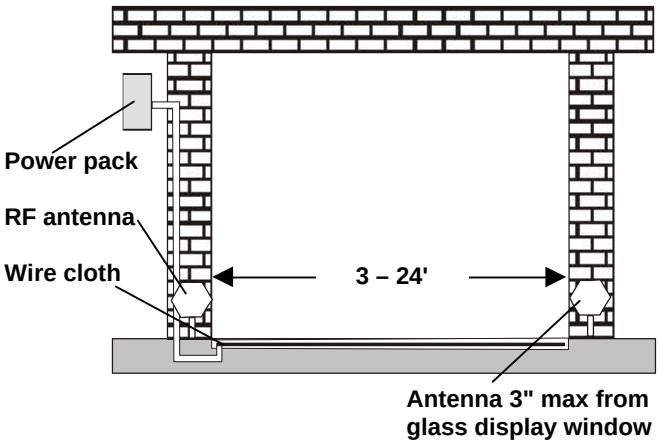
The Micromax with wire cloth system consists of two plastic helix type RF antennas, each mounted and enclosed in plastic housing pods suspended from the ceiling or mounted to the floor. The housings are faced toward each other at a typical distance range from 3 to 24 feet depending upon the installation. In between the housings lays an electrostatic radiator, a wire cloth antenna whose length is less than the separation between the pods. The wire cloth is usually recessed in the floor or sometimes laid on the surface and covered with a rubber mat.

The antennas are connected to the transmitter/receiver power pack via shielded coaxial cables. The transmitter/receiver power pack has an optional cosmetic enclosure.

Components:

- Power Pack
- RF antenna (helix)
- RF antenna pod
- Electrostatic field wire cloth antenna
- Typical cosmetic mounting enclosure

Figure 8. Micromax with wire cloth



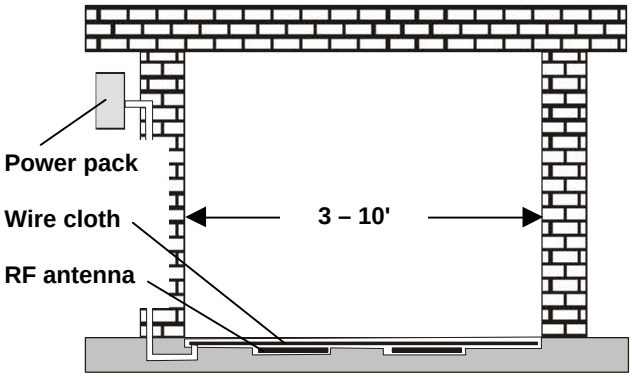
Sensormat II with wire cloth

The Sensormat II with wire cloth system consists of two patch RF antennas and an electrostatic field wire cloth antenna. The patch antennas are placed on one side of the wire cloth at a typical distance of 4 feet. The Sensormat II physically covers a typical exit path from 3 to 10 feet wide, depending upon the installation. The wire cloth and the patch antennas are recessed in the floor. The antennas are connected to the transmitter/ receiver power pack via shielded coaxial cables. The transmitter/ receiver power pack has an optional cosmetic enclosure.

Components:

- Power Pack
- RF patch antenna
- Electrostatic field wire cloth antenna
- Typical cosmetic mounting enclosure

Figure 9. Sensormat II with wire cloth



Formica laminated particle board is currently used to assemble the non-metallic and cosmetic mounting enclosures referred to above.

Enclosures could be constructed of similar materials, i.e. plastic, fiberglass, etc. without affecting the generated fields. The materials used and the enclosure dimensions may vary for custom installations.

Specifications

Electrical

AC Step-down Transformer

Primary Input:.....100, 120, or 230Vac, 50/60Hz

Fused Secondary Output: ..24Vac, 50VA, 2.08A

Fuse: .....2.5A LKB STD fast-blow

DC Power Supply

Resettable Polyswitch:.....3.0A at 20°C (derates to 2.1A at 50°C)

Positive Regular Outputs: ..+15.8, +12, +8, +5Vdc

Negative Regular Outputs:..-16, -12Vdc

Rated Current (w/o alarm) .<1.5A at 20°C with RF frequency at 915MHz; E-field at 500Vp-p, 111.5kHz, 11,000pF load

Rated Current (with alarm).<2.0A at 20°C with RF frequency at 915MHz; RF power at level 10, E-field at 500Vp-p, 111.5kHz, 11,000pF load; alarm volume at maximum

RF Antenna

Dual Helix, Dual patch, Micro II dish

RF Cable

RG142, RG142 B/U 50 ohm

E-Field Generator

Modulated Input Frequency: 442 – 450kHz in 2kHz increments

Modulated Output Frequency: 111.5 – 112.5kHz in 500Hz increments

Modulation:.....FSK, 650 – 950Hz

Output Voltage: .....1000Vp-p maximum at minimum capacitance; 500V maximum at maximum capacitance

Resonance Range: .....Continuous capacitance, 50pF – 11,000pF

IF FM Detector

Center Frequency:..... 111.5kHz

IF Bandwidth (module): ..... ±4.38kHz maximum

Modulation Frequency Generator: 650 – 950Hz

Transmitter

RF Synthesizer Frequency Range: 900 – 920.1MHz (U.S. range: 902 – 928MHz)

RF Stability (RFS): ..... RFS <±25ppm
F(TX) = 900MHz, ±22.500kHz
F(TX) = 905MHz, ±22.625kHz
F(TX) = 920.1MHz, ±23.003kHz

RF Bandpass Filter 3dB Bandwidth: 890 – 915MHz

US RF Frequency:..... Voluntary restricted to 902.7 – 904.9MHz

RF Output Power Maximum: +21dBm/port

Power Difference:..... 0.5dB maximum between 902.7MHz – 904.9MHz

Frequency Hopping Mode: (Complies with FCC Part 15.247)
Selectable RF Banks:2

Frequency Modulation:..... Mod. Freq. = 1.2kHz

Adjacent RF Channel Spacing: 30kHz

RF Channels per RF Bank: >50

RF Hopping Channel:..... 30kHz minimum

RF Channel Selection: ..... Determines by pseudorandom code sequence

Output Filter 3dB DW:..... 888 – 915MHz

RF Receiver

RF Bandpass Filter 3dB Bandwidth: 890 – 915 MHz

IF Bandwidth: ..... BW < or = ±3.5kHz

Input Filter 3dB BW:..... 888 - 915MHz

Sensitivity: ..... = .1257microVrms

Environmental

Operating Temperature:.... -10 to 50°C (14°–122°F)

Relative Humidity: .....0 to 90% non-condensing

Mechanical

Power Pack

Length .....61cm (24")
Width .....23.5cm (9.25")
Depth.....4.4cm (1.75")
Weight.....4.6kg (10.2 lbs)

RF Antenna (Dish)

Length .....3.6cm (1.4")
Diameter.....19.8cm (7.8")

RF Antenna (Helix)

Length .....32cm (12 5/8")
Width .....15.2cm (6")
Depth.....15.2cm (6")

RF Antenna (Patch)

Length .....28.3cm (11 1/8")
Width .....14.9cm (5 7/8")
Depth.....0.6cm (0.25")

Slimline Antenna

Length .....20.3cm (8")
Width .....15.2cm (6")
Depth.....0.2cm (1/16")

Plate Antenna

Length .....50.5cm (19.9")
Width .....22.4cm (8.8")
Depth.....0.6cm (0.25")

Wire Cloth Antenna

Length .....varies
Width .....8.9cm (3.5")
Depth.....0.3cm (1/8")

Vortex Bar

Length .....varies
Width .....5cm (2")
Depth.....1.3cm (0.5")

Metal Mounting Frame

Length..... 116.8cm (46")
Width ..... 26cm (10.25")
Depth ..... 4.4cm (1.75")

Cosmetic Enclosure (Old)

Length..... 118.1cm (46.5")
Width ..... 46.4cm (18.25")
Depth ..... 7.3cm (2 7/8")

Cosmetic Enclosure (New)

Length..... 118.1cm (46.5")
Width ..... 30.5cm (12")
Depth ..... 7.3cm (2 7/8")

Cosmetic Enclosure (Typical)

Length..... 106cm (41.75")
Width ..... 32.4-43.2cm (12.75-17")
Depth ..... 31.1cm (12.25")

Non-metallic Enclosure

Length..... 106cm (41.75")
Width ..... 32.4-43.2cm (12.75-17")
Depth ..... 31.1cm (12.25")

Rubber Mat

Length..... varies
Width ..... 35.6cm (14")
Depth ..... 0.6cm (0.25")

RF Antenna Pod

Length..... 39.4cm (15.5")
Width ..... 18.4cm (7.25")
Depth ..... 18.4cm (7.25")

Declarations

Regulatory Compliance

EMC: ..... 47 CFR, Part 15

Safety: ..... UL1950 (UL)
Can/CSA C22.2 No. 950
EN60950 (CE)

FCC COMPLIANCE: This equipment complies with Part 15 of the FCC rules for intentional radiators and Class A digital devices when installed and used in accordance with the instruction manual. Following these rules provides reasonable protection against harmful interference from equipment operated in a commercial area. This equipment should not be installed in a residential area as it can radiate radio frequency energy that could interfere with radio communications, a situation the user would have to fix at their own expense.

EQUIPMENT MODIFICATION CAUTION: Equipment changes or modifications not expressly approved by Sensormatic Electronics Corporation, the party responsible for FCC compliance, could void the user's authority to operate the equipment and could create a hazardous condition.

Other Declarations

WARRANTY DISCLAIMER: Sensormatic Electronics Corporation makes no representation or warranty with respect to the contents hereof and specifically disclaims any implied warranties of merchantability or fitness for any particular purpose. Further, Sensormatic Electronics Corporation reserves the right to revise this publication and make changes from time to time in the content hereof without obligation of Sensormatic Electronics Corporation to notify any person of such revision or changes.

LIMITED RIGHTS NOTICE: For units of the Department of Defense, all documentation and manuals were developed at private expense and no part of it was developed using Government Funds. The restrictions governing the use and disclosure of technical data marked with this legend are set forth in the definition of "limited rights" in paragraph (a) (15) of the clause of DFARS 252.227.7013. Unpublished - rights reserved under the Copyright Laws of the United States.