

# 900 PRIME Installation Manual

Are you connected...



## **WARNING!!!**

**Clear line of sight between the Radio Frequency equipment is mandatory. This means that both antennas are visible to each other in order to achieve the distances advertised. If installed with floors or walls between the antennas distances will be significantly reduced.**

**Basic RF and Data installation rules MUST be adhered to:**

- **Common DC ground must be installed between all low voltage power supplies. Isolate this ground to ensure NO earth ground contact is made.**
- **Supplied DC voltage must be from a well-filtered, approved power supply. This power supply should meet all FCC and UL requirements.**
- **No metal shrouding should be place near or around the antenna or the antenna base. Such shrouding will diminish the antennas output and the advertised distances will be affected.**
- **Shielded wire with a drain wire should be used in all cases with the drain wire only being connected at the power supply end to earth ground.**
- **Wiring methods should be completed in a manner consistent with local electrical standards.**
- **DO NOT HOT SWAP CARD READERS. Remove power before disconnecting or attaching card readers.**

## Content

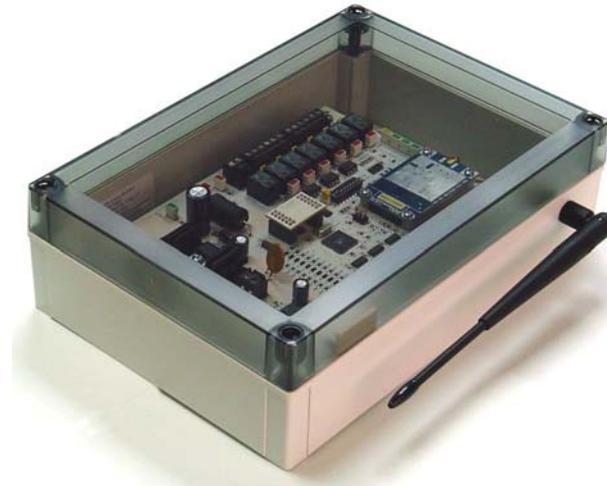
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# 1 General

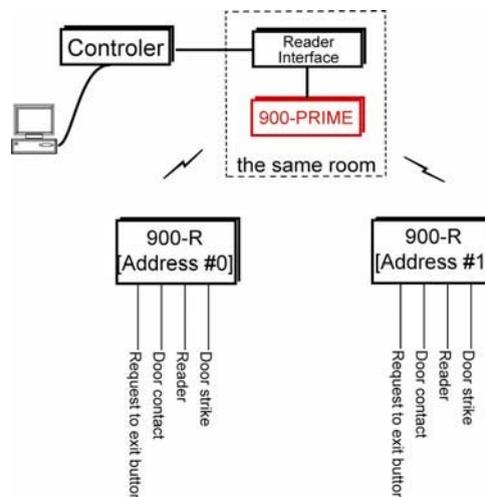
The 900 PRIME is a wireless access control module which is designed as a 2-reader interface panel. It provides 2 Wiegand ports that are compatible with up to a 63 bit Wiegand signal.



**Figure 1-1 900 PRIME Overview**

The 900 PRIME is always connected to the host reader interface panel in the system. It is designed to be used with a 900-R that is connected to the card reader, door strike, request to exit etc. The system is capable of working either as a 1-to-1 system or 1-to-2 system (1 Host Reader Interface with either 1 or 2 900-R remote side Card Reader interfaces).

The 900 PRIME provides 6 analog outputs that can be customized by the Resistor Pack. The outputs are separated into two parts. The OUT1~OUT3 are triggered by 900-R/1 (first door unit); the OUT4~OUT6 are triggered by the 900-R/2 (second door unit). A Form-A relay output is dedicated as an offline alarm. There are 6 inputs. They are also separated as IN1~IN3 for the first 900-R (#0) and IN4~IN6 for the second (#1).



**Figure 1-2 Typical System Diagram of 900-PRIME**

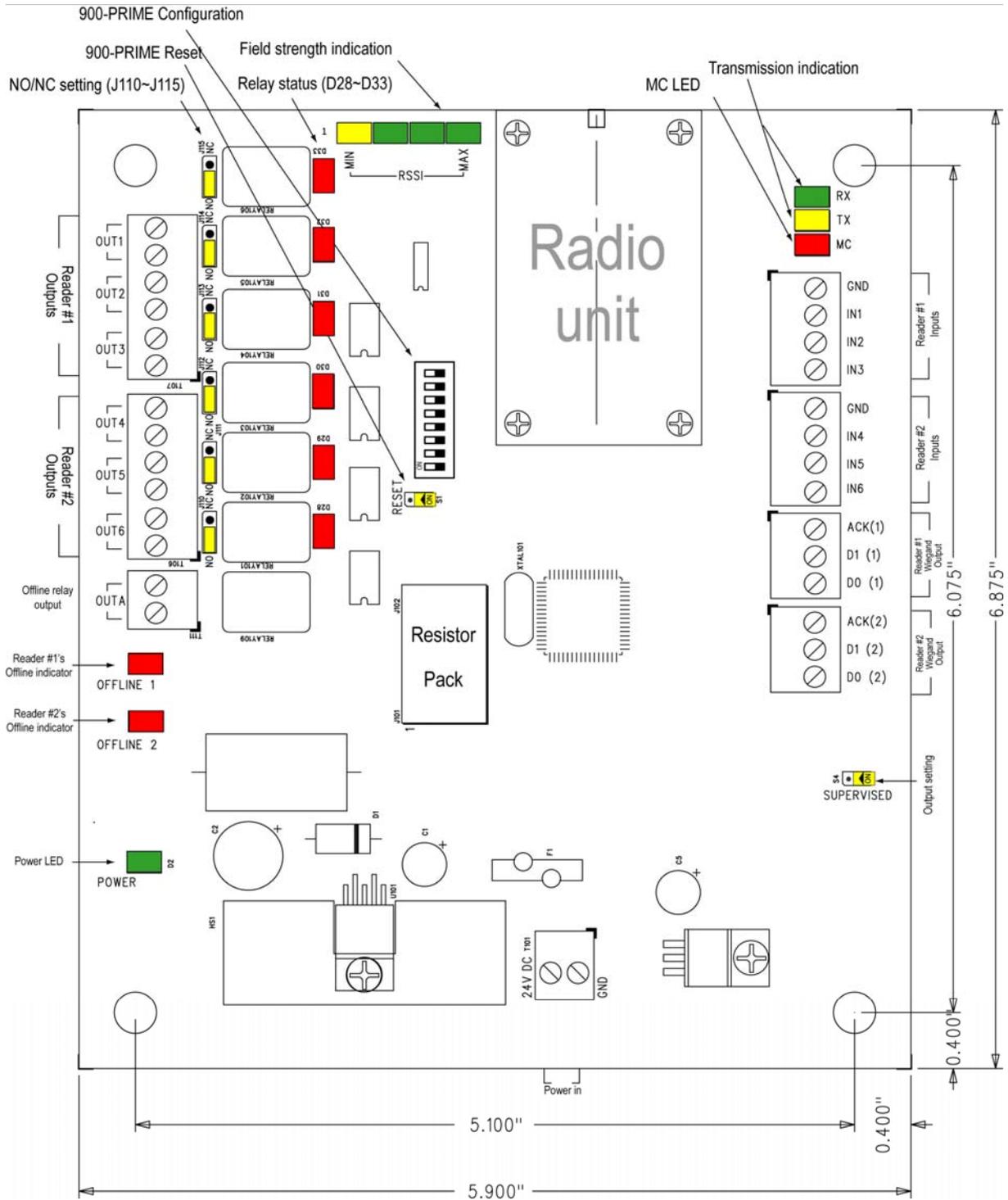


Figure 1-3 900-PRIME Board

**Note: #0: 900-R address set 0  
 #1: 900-R address set 1**

## 2 Indicators

The 900-PRIME provides indicators to display its status conveniently. These LED's allow the user to monitor the status of the 900-PRIME.

### 2.1 Power LED (Green)

This LED indicates if the 900-PRIME unit has power. Lit LED indicates power. If the LED is not on, check the power source.

### 2.2 Relay Status

There are 7 LED's to display the relay's status. A lit LED indicates that the corresponding relay is triggered.

### 2.3 Field Strength Indicator (Receive Signal Strength Indicator)

These LED's display the **RECEIVE** signal strength. From left to right, it indicates:

- 1 LED (Yellow) - Consider an antenna upgrade
- 2 LED's (Yellow + 1 Green) - Satisfactory
- 3 LED's (Yellow + 2 Green) - Satisfactory
- 4 LED's (Yellow + 3 Green) - Excellent

### 2.4 Data Communication Indicator

These two LED's should be flashing throughout operation.

- RX (Green) – RF module receives the signal.
- TX (Yellow) – RF module transmits the signal.

### 2.5 MC LED

For factory use only.

## 2.6 Offline Indicator

These two LEDs indicate the 900-PRIME's RF link status. The OFFLINE1 LED is dedicated to 900-R #0; the OFFLINE2 LED is dedicated to #1.

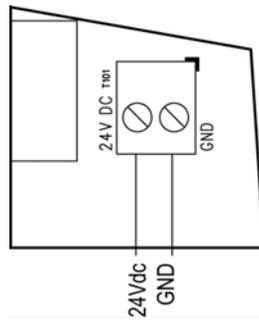
The LED is off when the module is in the normal state. An illuminated LED indicates that corresponding 900-R is offline.

- When the 900-PRIME is configured as a 1-to-2 system, a communication failure will cause the offline relay to trigger and the inactive 900-R to illuminate.
- When 900-PRIME is configured as a 1-to-2 system, a communication failure will cause the offline to trigger and will also illuminate the corresponding offline LED.

***Note: In the 1-to-1 system the unused Reader Device will always show as offline.***

### 3 Power to the 900-PRIME

The module accepts 10-28Vdc for power only. Locate the power source as close to the module as possible. Make power connections with a minimum of 18AWG (Belden 9740 or equivalent) wire. When using separate power supplies for the 900 Prime and the Host interface be sure to run a common wire between the negative of the hosts DC power and the negative of the 900 Primes DC power supply.



**Figure 3-1 Power to 900-PRIME**

## 4 900-PRIME Setting

### 4.1 RF Channel Setting

The 900-PRIME supports 10 different hopping schemes (CH0 ~ CH9), which MUST be set to the same number as the 900-R that communicates with this module. DIP switch SW1 is used for setting the channel.

SW1-S1	SW1-S2	SW1-S3	SW1-S4	CHANNEL
OFF	OFF	OFF	OFF	CH0
ON	OFF	OFF	OFF	CH1
OFF	ON	OFF	OFF	CH2
ON	ON	OFF	OFF	CH3
OFF	OFF	ON	OFF	CH4
ON	OFF	ON	OFF	CH5
OFF	ON	ON	OFF	CH6
ON	ON	ON	OFF	CH7
OFF	OFF	OFF	ON	CH8
ON	OFF	OFF	ON	CH9

Figure 4-1 900-PRIME RF Channel Setting

### 4.2 RF VID Setting

The RF module MUST be set to the VID number that matches the 900-R that it communicates with. This setting is done by S5 of DIP switch SW1.

SW1-S5	VID
OFF	0
ON	1

Figure 4-2 900-PRIME RF VID Setting

### 4.3 RF Power Setting

To get an effective transmit range, 2 power levels (500mW or 1W) are selectable for the RF.

S8 of SW1 is for setting RF power level.

SW1-S8	Power Level
OFF	500mW
ON	1W

Figure 4-3 900-PRIME RF Power Setting

**CAUTION:** Should be taken when using the 1W RF output as this setting requires double the VA input from your selected Power supply and improper selection of an adequate Power supply may cause malfunction and damage.

#### 4.4 Work Mode Setting

For each 900-PRIME module, two work modes 1-to-1 and 1-to-2 can be selected. This setting is done by S7 of SW1.

S7	Work Mode
OFF	1-to-1 (ONE 900-R)
ON	1-to-2 (TWO 900-R)

Figure 4-4 Work Mode Setting

#### 4.5 Output Setting

Factory default of these units is Unsupervised. This selection can be changed to Supervised by setting jumper S4.

Custom resistor packs are required for supervised mode based on your HOST SYSTEM requirements.

Jumper Setting	Description	Function
S4  SUPERVISED	OFF / Open	Unsupervised
S4  SUPERVISED	ON / Closed	Supervised

Figure 4-5 Output Setting

#### 4.6 Resistor Pack

The Resistor Pack can be customized to satisfy the OEM access control system requirements.

All 900-Prime modules are shipped with an unsupervised Resistor Pack. Double check that the Resistor Pack is mounted properly before power on.

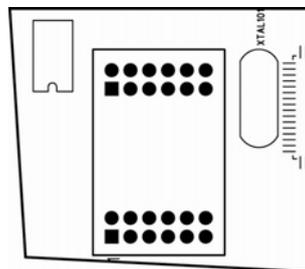


Figure 4-6 Resistor Pack Mounting

Information subjects to change without notice.

## 5 900-PRIME Wiring

### 5.1 Input/Output Corresponding

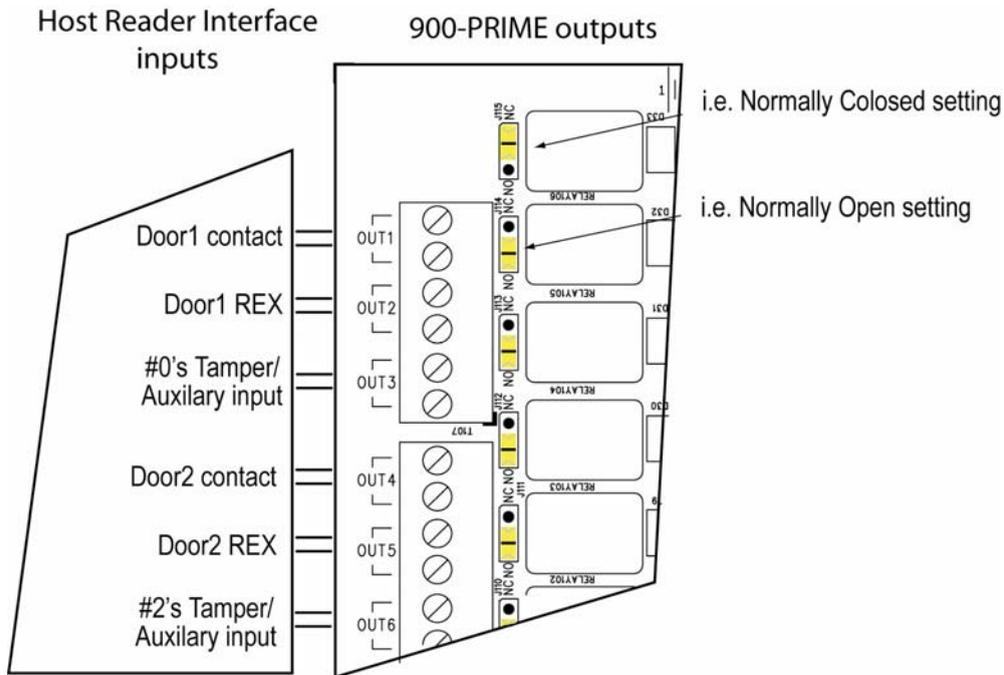
Here is the corresponding list of input/output table for the 900-PRIME and 900-R. This table will work for both 1-to-1 and 1-to-2.

900-R (#0)	900-R (#1)	900-PRIME	Host Interface
IN1(Door contact)		ÆOUT1	IN1 (Door contact)
IN2 (Request to EXIT)		ÆOUT2	IN2 (Request to EXIT)
IN3 (Tamper alarm)		ÆOUT3	IN3 (Tamper alarm)
D0		ÆD0	D0 (Wiegand input)
D1		ÆD1	D1 (Wiegand input)
	IN1(Door contact)	ÆOUT4	IN4 (Door contact)
	IN2 (Request to EXIT)	ÆOUT5	IN5 (Request to EXIT)
	IN3 (Tamper alarm)	ÆOUT6	IN6 (Tamper alarm)
	D0	ÆD0-2	D0(2) (Wiegand input)
	D1	ÆD1-2	D1(2) (Wiegand input)
OUT1 (Door strike)Ä		IN1	Relay output 1 (Door strike)
OUT2Ä		IN2	Relay output 2
OUT3Ä		IN3	Relay output 3
	OUT1 (Door strike)Ä	IN4	Relay output 4 (Door strike)
	OUT2Ä	IN5	Relay output 5
	OUT3Ä	IN6	Relay output 6
ACK1Ä		ACK1	ACK 1 or LED output 1
	ACK1Ä	ACK2	ACK 2 or LED output 2

Figure 5-1 I/O Table

## 5.2 Output Wiring

The 900-PRIME output connects to the host reader interface panel. The OUT1 ~ OUT3 on the 900-PRIME are triggered by inputs on the 900-R #0, and the OUT4 ~ OUT6 on the 900-PRIME are triggered by the 900-R #1's inputs (see per **Figure 5-1**).



**Figure 5-2 900-PRIME Output Wiring**

In a typical access control setup:

- OUT1 / OUT4 – Door contact
- OUT2 / OUT5 – Request to Exit
- OUT3 / OUT6 – Tamper alarm or Aux. alarm

Factory default output setting is Normally Open.

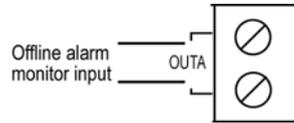
Output [900-PRIME]	Inputs [900-R]	Jumper setting [J110~J115]	(Un)supervised [S4]
Open	Open	NO	Unsupervised
Closed	Closed	NO	Unsupervised
Closed	Open	NC	Unsupervised
Open	Closed	NC	Unsupervised
Closed	Open	NO	Supervised
Open	Closed	NO	Supervised
Open	Open	NC	Supervised
Closed	Closed	NC	Supervised

**Figure 5-3 Output Configuration**

Use minimum 18AWG (Belden 9740 or equivalent) for the connection.

### 5.3 Offline Alarm Wiring

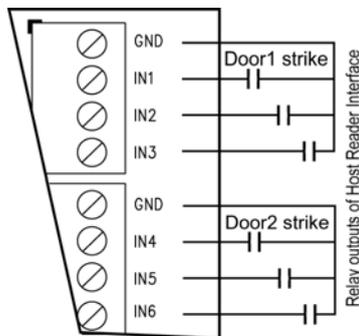
The OUTA is a form-A relay output that is dedicated to the offline alarm. Its normal state is normally open and changes state to closed when an offline occurs or if the module loses the power.



**Figure 5-4 Offline Wiring**

### 5.4 Input Wiring

The input of 900-PRIME connects to the host reader panel of the HOST output. In a typical access control system, IN1 and IN4 connect to the DOOR STRIKE control output. All inputs accept dry contact only.

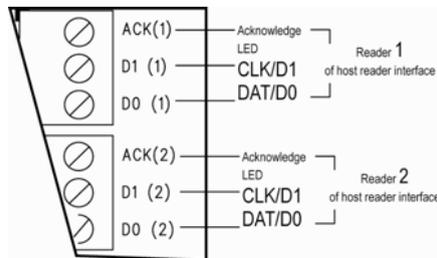


**Figure 5-5 900-PRIME Input Wiring**

The 900-PRIME requires one twisted pair per input, 30 ohms max, 24AWG (Belden8740 or equivalent).

## 5.5 Weigand Port Wiring

The 900-PRIME supports two Weigand ports (Clock/D1, Data/D0, and Acknowledge/LED). D0 (1), D1 (1), and ACK (1) designated to the READER1; D0 (2), D1 (2), and ACK (2) are used for READER2.



**Figure 5-6 Wiegand Ports Wiring**

Use minimum 22AWG (Belden 9740 or equivalent) for the connection.

Note: There **MUST** be a **COMMON GND** between the 900-PRIME and the Host Reader Interface in order to get a proper Wiegand signal.

## 6 900-PRIME Reconfiguration

### 6.1 900-PRIME Reset

The jumper S1 (RESET) is used to hold the processor in reset mode. As this operation could cause all outputs to enter a non-normal state, it is highly recommended to disconnect all inputs and outputs before the 900-PRIME is reset.

S1 is a switchable jumper; it **MUST** be set to **OPEN** state for the 900-PRIME's normal use.

Jumper Setting	Description	Function
	OFF / Open	Normal use
	ON / Closed	Reset

Figure 6-1 900-PRIME Reset

### 6.2 Configuration and Reconfiguration of the System

After changing the setting on the DIP switches the radio requires reprogramming. This is done automatically through the RESET; however it is vital that the microprocessor completes its work prior to connecting inputs and outputs or modifications to the system. This can be visually observed when the MC LED changes from solid on to normal status (blink faster and weaker). Any interference during this operation could cause the radio to be programmed incorrectly which will result in the permanent failure and possible damage to the radio.

Any incorrect setting of Channel, Address or VID will be reported by the MC LED. It will be appeared as a 'pulsed on' flash.

## 7 Specification

The module is for use at low voltage, class 2 circuits only.

Primary power	DC input:	10 - 28Vdc, 600mA
Communication		900 MHz RF OEM Module
	Frequency range:	ISM 902M ~ 928MHz
	Channel Capacity:	10 hopping sequences on 50 frequencies
		Indoor/Urban Range(w/ 2.1 dBi dipole antenna): up to 1,500' (450 m)
		Outdoor RF line-of-sight Range(w/ 2.1 dBi dipole antenna): up to 2 miles (4 km)
		Outdoor RF line-of-sight Range(w/ high-gain antenna): up to 10 miles (16 km)
Reader Interface	Wiegand:	2 Wiegand ports (Clock/D1, Data/D0, Acknowledge/LED)
Input		6 inputs
Output	Output:	6 analog outputs 1 form-A relay output, dedicated offline alarm
Wire requirement	Power:	1 twisted pair, 18AWG (Belden 9740 or equivalent)
	Input:	1 twisted pair, 30 ohms max, 24 AWG (Belden 8740 or equivalent).
	Output:	As required for load
	Reader:	6 connectors, 22AWG, 500 feet (150m) max.
Environmental	Temperature:	0 to 50 °C, operating -15 to +85 °C, storage
	Humidity:	0 to 85% RHNC
Mechanical	Dimension:	5.90" (150mm) W x 6.88" (175mm) L x 1.20" (30mm)

## 8 RF Communication Link

Because wireless technology is being used for the linkage, there are maximum limitations in which these devices can function. Many factors can contribute to the effectiveness of the communication. Refer to "Fresnel Zones" and "Faraday Cage" white papers.

### 8.1 Installation Location

For optimum installation, a 900 MHz Tester should be used to finalize location selection. The TK900F is a device that can test your linkage capabilities for the installation site. Please contact cramZ marketing for information on obtaining an TK900F tester kit.

### 8.2 Antenna Orientation

The 900-PRIME has been supplied with a swivel antenna for RF transmission. This is an omni-directional antenna. This type of antenna will allow the user to orientate the antenna to obtain the maximum desired transmission and reception of signal.

### 8.3 Signal Degradation

Many factors can contribute to signal degradation. The 900-PRIME can penetrate concrete in most situations. The thickness of the concrete and the number of layers will contribute to the degradation of the signal. For optimum signal strength, it is suggested that a minimum amount of obstruction be placed in the path of transmission between 900-PRIME and 900-R.

### 8.4 Minimum Separation Distance

In order to comply with RF Exposure requirements, the RF module must be installed and operated in such a way so as to maintain a minimum separation distance between the antennas during normal operation.

Power Output	Separation Distance
500mW	3 feet
1W	7 feet

**Figure 8-1 Minimum Separation Distance**

## 9 FCC Compliance

- This device has been authorized by the FCC Rules and Industry Canada.
- This device complies with the limits for a Class B digital and Class B intentional radiator, pursuant to Part 15 of FCC Rules and with RSS-210 of Industry Canada. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.
- The RFwireless component must be installed by qualified professionals or contractors in accordance with FCC part 15.023, Antenna Requirements.
- Do not use any antenna other than an approved antenna, such as the one provided with the unit.

## 10 UL Compliance

- This device is tested to UL 294 standards with the Mercury Security access control system but is not exclusive to that system.
- This device is tested to UL 294 standards with the HID reader.

## 11 Warnings

RFWireless/cramZ marketing is in no way liable for incorrect installations of its wireless products which may cause damage to equipment or persons. End users, installers, purchasers or anyone using, buying, selling or using this product must follow the exact installation instructions as outlined in the instruction manual. Correctly installed equipment including approved enclosures and wiring must be used as outlined in the installation or user manual. Failure to follow instructions outlined in this instruction manual will void the listed approvals and any warranty.

Any changes or modifications not expressly approved by RFWireless/cramZ marketing will void the approvals by all governing bodies and void any product warranty.

Installation must be carried out by a trained authorized access control installation technician to all local or municipal governmental electrical codes.

## 12 Warranty

RFWireless/cramZ marketing warrants the product to be free from defects in material and workmanship under normal use and service with proper maintenance for one year from the date of factory shipment. Alertco RF / RFID assumes no responsibility for products damaged by improper handling or installation. RFWireless/cramZ marketing shall not be held responsible for any liabilities which might arise from the use of this equipment. There are no expressed warranties other than set forth herein. RFWireless/cramZ marketing does not make, nor intends, nor does it authorize any agent or representative to make any other warranties, or implied warranties, and expressly excludes and disclaims all implied warranties of merchantability or fitness for a particular purpose.

This warranty is limited to the repair or replacement of the defective unit. Repair or replacement shall be solely at the discretion of RFWireless/cramZ marketing upon receipt of returned goods. Returns must be accompanied by a return authorization number (RMA) obtained from customer service, and prepaid postage and insurance.

## 13 Liability

This 900 PRIME module, being an RF device, should only be used to control exits from areas where an alternative method for exit is available. This product is not intended for, nor is rated for operation in life-critical control applications. RFWireless/cramZ marketing is not liable under any circumstances for loss or loss of life or any damage caused by or partially caused by the misapplication or malfunction of the product. RFWireless/cramZ marketings' liability does not extend beyond the purchase price of the product. Installation of the equipment shall constitute acceptance of RFWireless/cramZ marketings' limited liability.

