900-R (remote) Installation Manual

Are you connected...

wirelessly

WARNING!!!

Clear line of sight between the Radio Frequency equipment is mandatory. This means that both antennas must be 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 <u>NO</u> 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. AVOID REVERSE POLARITY!

- No metal shrouding should 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.

Content

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1 General

The 900-R is a 900MHz wireless module which is compatible to OEM systems that use Weigand type readers and door hardware. The 900-R connects spatially separated access control modules without the use of wires.
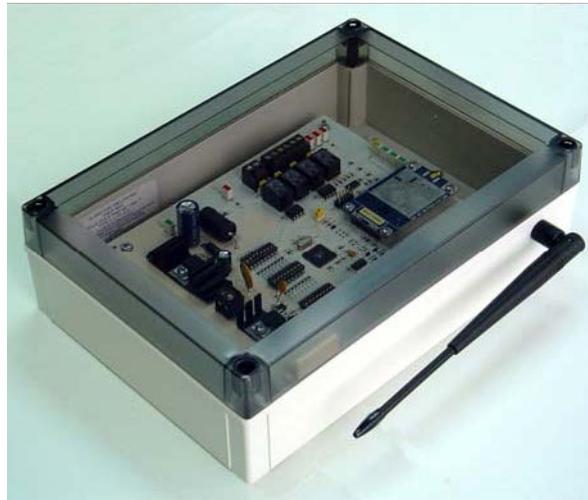
Figure 1-1 900-R Overview

900-R functions as a pair with a 900-PRIME. It wirelessly connects a reader, request to exit button, door contact, door strike etc. to a host reader interface (HRI). It is compatible with up to a 50-bit Wiegand signal. Customized Wiegand formats are available.

900-R supports 1 card reader interface with 5V or 12Vdc power supply, 3 supervised or 3 unsupervised inputs, 3 selectable form-C relay output, and 1 fixed normally open offline alarm relay output.
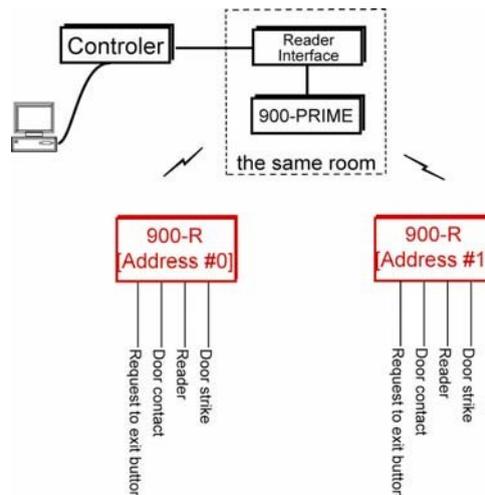
Figure 1-2 Typical System Diagram of 900 Series
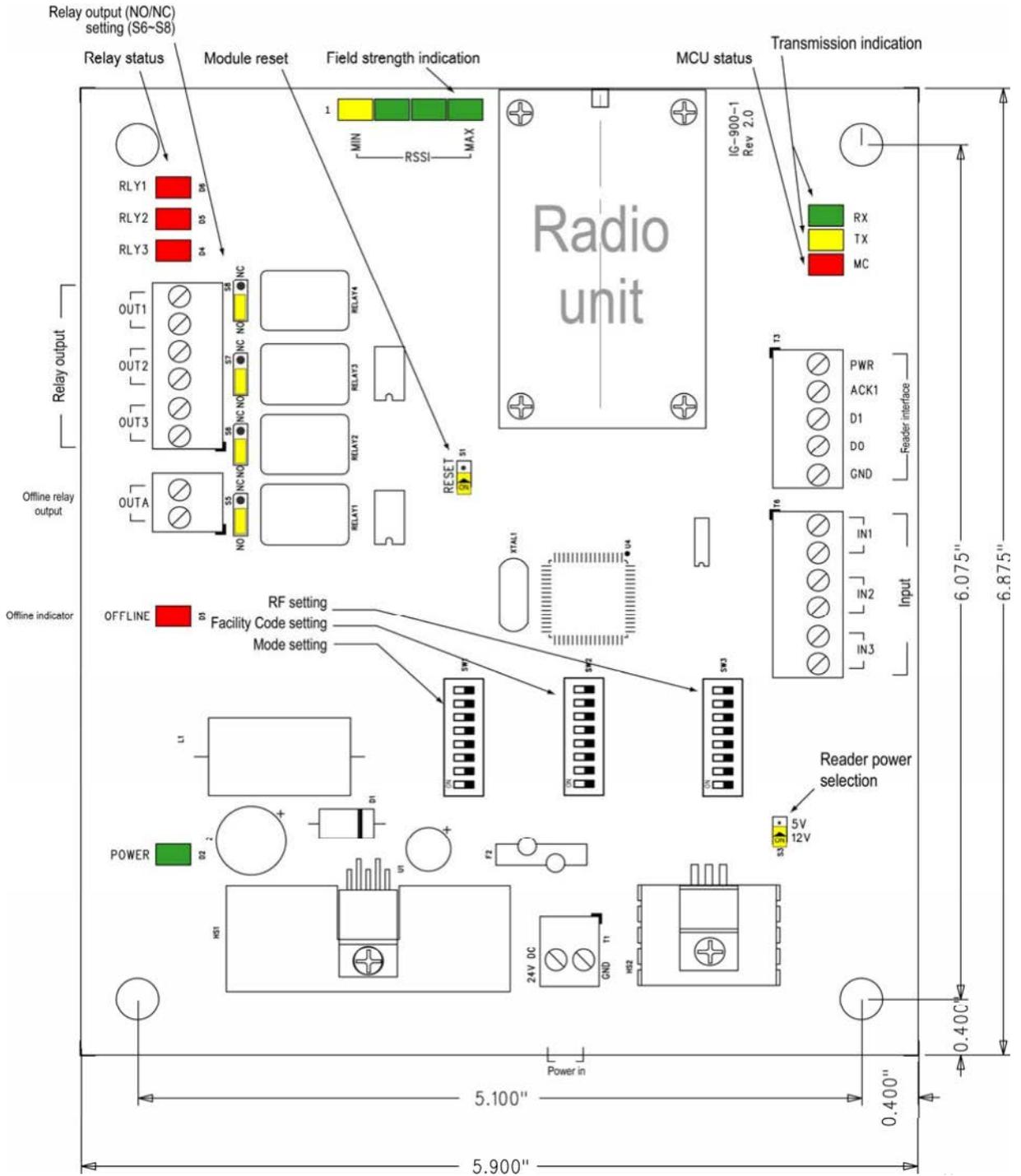
Figure 1-3 900-R Board Diagram

2   Indicators

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

2.1   Power LED (Green)

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

2.2   Offline LED

This LED indicates the 900-R's RF link status. The LED is off when the module is in the normal status, or it will be on to show the offline as the relay was triggered and the OUTA has changed its state.

2.3   Relay Status

There are 3 LED's to display the relay's statuses. The LED lit indicates that the relay is triggered.

2.4   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 LEDs (Yellow + 1 Green)	- Satisfactory
3 LEDs (Yellow + 2 Green)	- Satisfactory
4 LEDs (Yellow + 3 Green)	- Excellent

2.5   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.

2.6   MC LED

For factory use only.

3   Power to the 900-R

The module accepts 24Vdc for power. Locate the power source as close to the module as possible. Make power connections with a minimum of 18AWG (Belden 9740 or equivalent) wire.
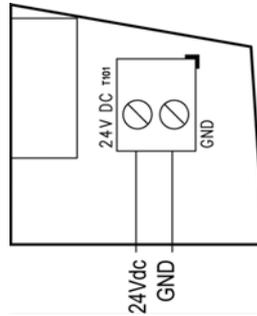
Figure 3-1 Power to 900-R

4   900-R Setting

4.1   RF Channel Setting

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

SW1-S3	SW1-S4	SW1-S5	SW1-S6	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 RF Channel Setting

4.2   RF VID Setting

The RF module *MUST* be set to the VID number that is the same as the 900-PRIME that it communicated with. This setting is done by S5 of DIP switch SW3.

SW3-S5	VID
OFF	0
ON	1

Figure 4-2 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. The 1W power setting will result in longer ranges.

S8 of SW3 is to setting RF power level.

SW3-S8	Power Level
OFF	500mW
ON	1W

Figure 4-3 RF Power Setting

Information subjects to change without notice.

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4.4   RF Address Setting

The host end module 900-PRIME can work with one or two 900-Rs. Unit 1 and unit 2 *MUST* be set to different address from each other. This setting is done by DIP setting switch SW3.

SW3-S1	SW3-S2	SW3-S3	ADDRESS
OFF	OFF	OFF	#0
ON	OFF	OFF	#1

Figure 4-4 RF Address Setting

4.5   Input Setting

Factory default of these units are Unsupervised. This selection can be changed to Supervised by setting S7 of SW3 to "ON".

SW3-S7	Input type
OFF	Unsupervised
ON	Supervised

Figure 4-5 (Un) Supervised Input Selection

4.6   Reader Power Setting

A built in reader interface on 900-R can support 5Vdc (100mA) or 12Vdc (100mA) reader. Jumper S3 is for reader power selection.

Setting	Description	Function
5V 12V ON S3	ON / Closed	5Vdc to Reader
5V 12V ON S3	OFF / Open	12Vdc to Reader

Figure 4-6 Reader Power Setting

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4.7   Offline Mode Setting

There are four modes which can be set for when communication is lost
among the modules. The mode is set by S1 and S2 of the SW1 settings.

4.7.1   Facility Code Only - 5 Second

In this mode, the cardholder will be granted access with a card with the correct facility code.
The facility code is set by SW2. When access is granted, the door will remain unlocked for 5
seconds. Use of the request to exit will also be granted.

4.7.2   Facility Code Only - 10 Seconds

This mode is the same as above with the exception of the unlock time being increased to 10
seconds.

4.7.3 No Action Mode

All cardholders will be denied. Use of the request to exit will be granted, unlocking the door
for 5 seconds.

4.7.4   Door Unlock Mode

The door will remain unlocked until normal communication is restored.

SW1-S1	SW1-S2	Selection
OFF	OFF	Facility Code Only (5S)
OFF	ON	Facility Code Only (10S)
ON	OFF	No-Action
ON	ON	Door Unlock

Figure 4-7 Offline Mode Setting

Information subjects to change without notice.

4.8   Facility Code Setting

The facility code *MUST* be set on SW2 as per **Figure 4-9**.

The facility code is established by the card manufacturer or installer. This code is designed to be unique to each building. Every card user will have this facility code along with their user ID. 900-R supports facility codes from 0 to 255.

SW2-S1	SW2-S2	SW2-S3	SW2-S4	SW2-S5	SW2-S6	SW2-S7	SW2-S8	Switch set ON
1	2	4	8	16	32	64	128	Value

Figure 4-8 SW2 Description

When a switch is set, the corresponding value is added to the facility code value.

The facility code is composed of the total switch value. For example:
239 (facility code) =1+2+4+8+32+64+128. In the above example S1-4 and S6-8 are switched. S5 is not.

SW2-S1	SW2-S2	SW2-S3	SW2-S4	SW2-S5	SW2-S6	SW2-S7	SW2-S8	Facility Code
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	0
ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	1
OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	2
ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	3
…	…	…	…	…	…	…	…	…
ON	OFF	OFF	ON	OFF	OFF	OFF	OFF	9
…	…	…	…	…	…	…	…	…
ON	OFF	OFF	OFF	OFF	ON	ON	OFF	99
OFF	OFF	ON	OFF	OFF	ON	ON	OFF	100
…	…	…	…	…	…	…	…	…
ON	ON	ON	ON	OFF	ON	ON	ON	239
…	…	…	…	…	…	…	…	…
ON	ON	ON	ON	ON	ON	ON	ON	255

Figure 4-9 Facility Code Setting

*Note: All unused DIP switches **MUST** remain in the "**OFF**" position.*

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5   900-R Wiring

5.1   Input/Output Corresponding

Here is the corresponding list of the input/output table for the 900-R and 900-PRIME. This table will work for both 1-1(one 900-R and one 900-PRIME) and 1-2 (one 900-PRIME and two 900-Rs).

900-R (#0)	900-R (#1)	900-PRIME
IN1		ÆOUT1
IN2		ÆOUT2
IN3		ÆOUT3
D0		ÆD0
D1		ÆD1
	IN1	ÆOUT4
	IN2	ÆOUT5
	IN3	ÆOUT6
	D0	ÆD0-2
	D1	ÆD1-2
OUT1A		IN1
OUT2A		IN2
OUT3A		IN3
	OUT1A	IN4
	OUT2A	IN5
	OUT3A	IN6
ACK1A		ACK1
	ACK1A	ACK2

Figure 5-1 I/O Table

5.2   Output Wiring

There are 3 outputs. These outputs are triggered by the 900-PRIME's inputs. In a typical access control setup, OUT1 is used for the door strike.

All output contacts can be selectable as normally open or normally closed by jumpers S6-S8.

The following diagram is an example of a typical wiring of DC and AC source application to outputs including an example of the NO/NC selection by jumper settings.

Factory default output settings are Normally Open.

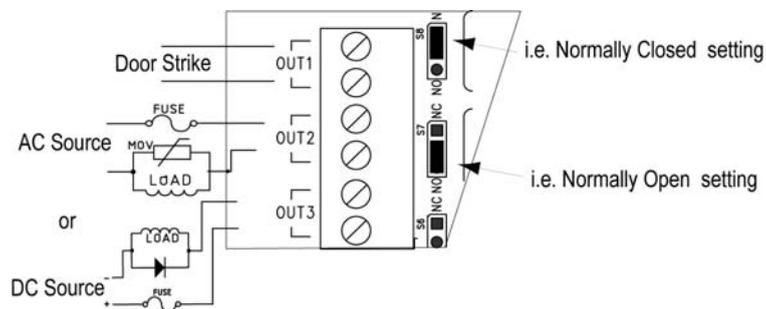Use minimum 18AWG (Belden 9740 or equivalent) for the connection.

Figure 5-2 900-R Output Wiring

Diode selection:
Diode current rating > 1X normal current
Diode break down voltage: 4X load operation voltage

Mov selection:
Clamp voltage > 1.5X Vac RMS

5.3   Input Wiring

IN1 and *IN2* are dedicated as a *Door Contact* and a *Request to Exit button* when 900-R is used in an access control system.

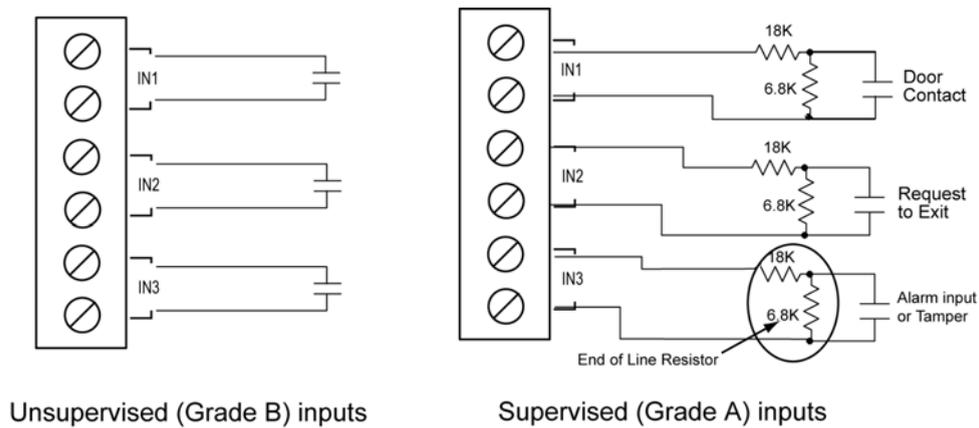When using Supervised input they must satisfy the requirements of supervising Host access control systems.

Figure 5-3 900-R Input Wiring

In Supervised mode, any input terminals that are not used *MUST* be *CLOSED*.

One twisted pair per input is required, 30 ohms max, 24AWG (Belden8740 or equivalent).

Note: The resistor value specified is for example value.

5.4   Reader Interface Wiring

The 900-R provides a reader interface connection for a Wiegand style reader. To fully utilize each reader port, a 5-conductor cable (18AWG) is required. For reader power selection, see per **Figure 4-6**.
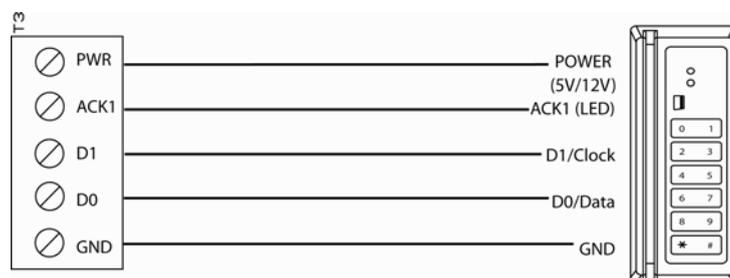

Figure 5-4 Reader Interface Wiring

Information subjects to change without notice.

6   900-R Reconfiguration

6.1   900-R Reset

The jumper S1 (RESET) is to hold the processor in reset mode. This operation could cause all outputs non-normal state, it is recommended strongly to disconnect all inputs and outputs before it is reset.

Keep jumper S1 open for normal state.

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

Figure 6-1 900-R Reset

6.2   Configuration and Reconfiguration of the System

After changing the setting on the SIP switches the radio requires reprogramming. This is done automatically through the microprocessor; 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 MC LED changes from solid on to normal status (blink faster and weakly). Any interference during this operation could cause the radio to be programmed incorrectly which will result in the permanent failure of the radio.

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

7   Specification

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

Primary power	DC input:	24Vdc, 600mA
Communication		RF OEM Module
	Frequency range:	ISM 902M ~ 928MHz
	Channel Capacity:	10 hop sequences share 50 frequencies
		Indoor/Urban Range(w/ 2.1 dB dipole antenna): up to 1500' (450 m)
		Outdoor RF line-of-sight Range(w/ 2.1 dB dipole antenna): up to 2 miles (4 km)
		Outdoor RF line-of-sight Range(w/ high-gain antenna): up to 40 miles (64 km)
Reader Interface	Wiegand:	Clock/Data or D0/D1, 26 – 50 bit
	Power:	12Vdc, 100mA or 5Vdc, 100mA selectable
Input		3 (Un)Supervised inputs
Output	Relay Output:	3 selectable form-C relay outputs, 30Vdc, 3A
Wire requirement	Power:	1 twisted pair, 18AWG (Belden 9740 or equivalent)
	Input:	1 twisted pair, 30 ohms max, 24 AWG (Belden 8740 or equivalent).
	Outputs:	As required for load
	Reader:	5 connectors, 18AWG, 500 feet (150m) max.
Environmental	Temperature:	0 to 49 °C, operating
		-55 to +85 °C, storage
	Humidity:	0 to 85% RHNC
Mechanical	Dimension (board):	5.90" (150mm) W x 6.88" (175mm) L x 1.20" (30mm)

Information subjects to change without notice.

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.

8.1 Installation Location

For optimum installation, a 900MHz Tester should be used to final 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 a TK900F tester kit.

8.2 Antenna Orientation

900-R has been designed 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-R can penetrate concrete. 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-R and 900-PRIME.

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 Alertco RF / RFID wireless component must be installed by qualified professional 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. For a complete list of approved antennas, contact RF Wireless Solutions

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 the RFID 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, including blown power supplies or damage done from "HOT SWAPPING" card readers. 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.