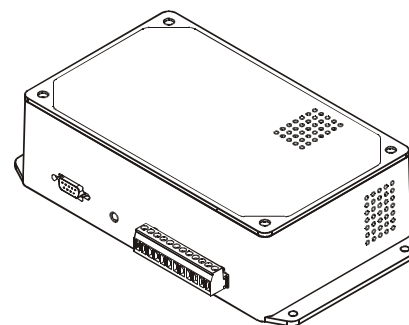
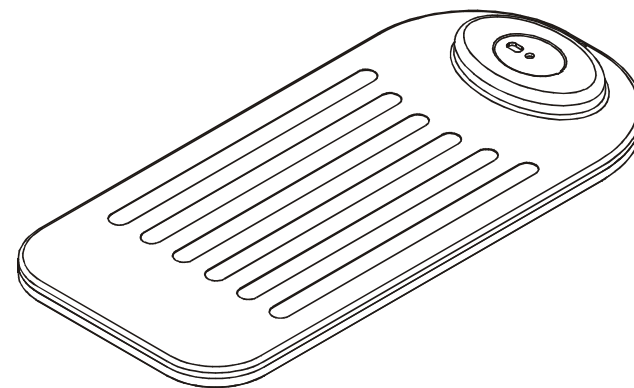




## Installation Guide

### Access Control Reader



For technical support:

- 1.866.559.6275
- [support@verichipcorp.com](mailto:support@verichipcorp.com)

[www.verichipcorp.com](http://www.verichipcorp.com)

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# Installation Guide for the Access Control Reader

## Contents List

Item	Quantity
Access Control Reader	1
which contains the sub-assemblies:	
• ACR Controller Module	1
• ACR Panel Antenna module	1

## System Verification

VeriChip™ systems are designed to assist staff in providing a high degree of safety for people and therefore should only be used as a component of a comprehensive security program of policies, procedures, and processes. As with every security system, **VeriChip highly recommends regular system operational checks** to verify functional integrity.

## FCC Regulations

This device complies with Part 15 of the FCC Rules. 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.  
 This equipment has been tested and found to comply with the limits for Class B Digital Device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures.

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and Receiver
- Connect the equipment into an outlet on a circuit different from that to which the Receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

### Modifications

Any changes or modifications not expressly approved by VeriChip Corporation for compliance could void the user's authority to operate the equipment.

## Cautions and Warnings



*This product is designed to meet the requirements for Class 2 circuits operating from a non-hazardous secondary power source limited to 240 VA. Cabling materials must be selected for the installation environment in accordance with the applicable jurisdictional codes.*

## Notes



## Notes

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

## EU Waste Electrical and Electronic Equipment

- ◆ The equipment that you bought has required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.
- ◆ In order to avoid the dissemination of those substances in our environment and to diminish the pressure on the natural resources, we encourage you to use the appropriate take-back systems. Those systems will reuse or recycle most of the materials of your end life equipment in a sound way.



- ♦ The crossed-out wheeled bin symbol invites you to use those systems.
- ♦ If you need more information on the collection, reuse and recycling systems, please contact your local or regional waste administration.

- ♦ You can also contact us for more information on the environmental performances of our products.

## Functional Description



The VeriChip™ Access Control Reader (ACR) is a wall mounted Antenna and Controller Module. The ACR detects the VeriChip™ implantable microchip, and extracts its unique identification. The ACR then sends both the microchip identification and its own identity number to one or more outputs depending on the ACR configuration.

The VeriChip ACR can:

- ◆ Work with new or existing VeriChip installations such as VeriGuard™ by communicating over the RS485 network
- ◆ Integrate into third party access control systems
- ◆ Operate as a stand alone reader



## Controller Module Description

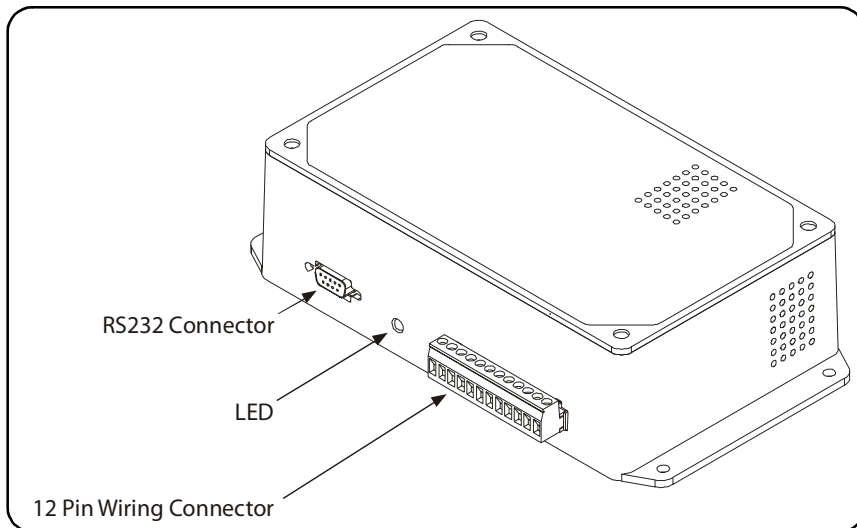
The Controller Module provides power, network, inputs and Antenna connections.

Power is connected to the 12 pin wiring connector which also provides normally closed (NC) relay inputs and a door contact input. See Table 1.

As shown in Figure 1 the Controller Module has a 12 pin and aN RS232 connector. These provide the following three network connections:

- ◆ An RS-485 network connection through the 12 pin wiring connector;
- ◆ A Wiegand output also through the 12 pin connector; and,
- ◆ An RS232 output.

### Figure 1: Controller Module Wiring Connections



The LED in Figure 1 signals network communication and power status.

### Table 1: ACR 12 Pin Wiring Connector

Pin #	Label	Type	Description
1	V in	DC Power In	500 mA @ 24 VDC $\pm$ 10%
2	GND	Power ground	
3	RS485+	RS485 Network	<ul style="list-style-type: none"> <li>• RS485 Sub-Network headed by Area Controller Hub.</li> <li>• 16 nodes, 230 kBytes/s</li> </ul>
4	Gnd	RS485 Ground	
5	RS485-	RS485 Network	

## Notes

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Document Control

Document Number: 981-000293-000

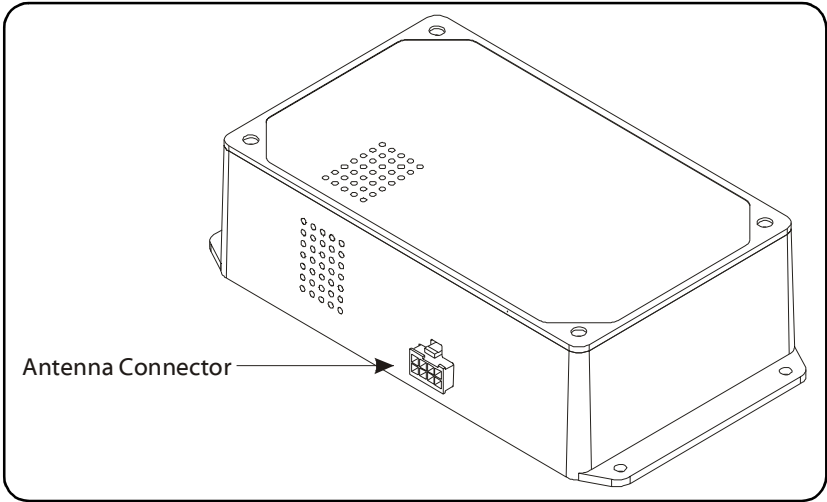
Date	Rev #	Comments
7 Feb. 06	R1.1	Released for testing.
3 Mar. 06	R1.2	Graphics added. Installation instructions expanded.
9 Mar. 06	R1.3	Antenna tuning instructions added.

Table 1: (Continued) ACR 12 Pin Wiring Connector

Pin #	Label	Type	Description
6	Relay N.O.	Relay Normally Open	<ul style="list-style-type: none"><li>• 10 A 250 VAC resistive</li><li>• Protective diodes are required for an inductive load.</li></ul>
7	Relay COM	Relay Common	
8	Relay N.C.	Relay Normally Closed	
9	Wiegand 0	Wiegand Data 0	Standard 26-bit format (24 data bits and 2 parity bits) Wiegand output.
10	Wiegand 1	Wiegand Data 1	
11	Input	Dry Contacts	Pins 11 and 12 form an input for a door contact or other device.
12	GND	Dry Contacts	

The Antenna cable plugs into the connector shown in Figure 2.

Figure 2: Controller Module Antenna Connection



Antenna Description

The Antenna can be mounted indoors either on a surface or inside a wall.

A 10 ft. (3 m) power/signal cable is permanently attached to the Antenna and mates with the Controller Module.



Preferred Practices

Mounting location and positioning are very important to this unit’s correct operation. Read and understand the information in “Access Control Reader Location” before you begin the installation.

The Antenna is very sensitive to its mounting location while the Controller Module is not. Additionally, you cannot extend the cable joining the Controller Module and Antenna. So, mount the Antenna in the best location; and then install the Controller Module in the best location within a 10 ft. (3 m) radius.

**NOTE: Do not alter the Antenna cable length.**

Record the location and serial number of the ACR for later inclusion in the floor plan.

Access Control Reader Location

When mounting the ACR, you must plan the best location for the Antenna and the Controller Module.

Antenna Location Considerations

The Antenna is a tuned circuit: When selecting a mounting location, consider the Antenna proximity to metal surfaces.

Optimally, mount the Antenna at least 6 in. away from any metal surface such as: metal studs in the wall, metal frames around doors, air ducts, or conduit and plumbing inside the walls.

Mount the Antenna to the right of persons approaching the controlled access point as the microchip is usually implanted in the right arm.

Antenna Height

The ACR should accommodate people of different heights without requiring them to stoop or stretch. Mounting the Antenna to suit the widest range of people is very important.

Figure 3 *LF Field Shape and Dimensions*, shows a side view of the Antenna and the extent of the LF Field. The field is greatest at the point labelled “Center of LF Field”. When mounting the Antenna, the aim is to place the Center of LF Field at the same height as the implanted microchip.

Specifications

The Access Control Reader (ACR) is a Controller Module and an Antenna joined by a 10 ft. (3 m) cable. The device reads the implantable VeriChip™ microchip. The ACR can work as: a stand-alone reader, an Integrated access control, or part of a VeriGuard™ system.

Physical Specifications

Operating Temperature	32° F to 122° F (0° C to 50° C)
Storage Temperature	-4° F to 131° F (-20° C to 55° C)
Relative Humidity	0% to 90% non-condensing
Dimensions (WxHxD):	Antenna: 7 in. x 5 in. x 1 in. (17.8 cm x 12.7 cm x 2.5 cm) Controller Module: 5 in. x 8 in. x 2.5 in. (12.7 cm x 20.3 cm x 6.4 cm)
Cable Length	10 ft. (3 m)
Weight:	Antenna and Cable: 1 lb. 12.3 oz. (802 g) Controller Module: 16.3 oz. (463 g)

Electrical Specifications

Power Supply	500 mA @ 24 VDC
Operating Frequency	134.2 kHz
SPDT Relay	10 A @ 250 VAC
Input	Dry Contact Input referenced to system ground

Network Connections

RS485	230 kBytes/sec, wiring connector
RS232	19.2 kBytes/sec, DB9 female
Wiegand Interface	24 data and 2 parity bit format, wiring connector

Indicators

Antenna:	LED: Green LED for power/microchip detect indication Buzzer: Single tone
Controller Module:	LED: Green LED for power/network activity indication



## Wiegand

In Integrated operation and Network operation, the ACR sends microchip information in standard 26 bit format Wiegand. This is an unacknowledged one-way communication. Third-party software that receives this data must ensure correct reception.

## RS232

An RS232 port provides connection to a PC running a terminal emulation program such as HyperTerminal® which is shipped with the Microsoft® Windows® operating system.

Set the terminal as follows: one stop bit, no parity, baud rate 19200.

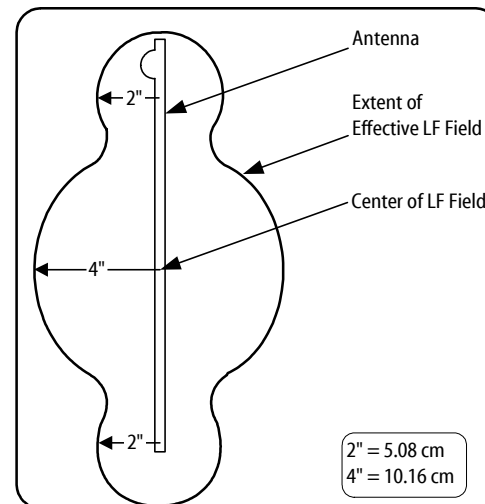
This is an unacknowledged one-way communication. Third-party software that receives this data must ensure correct reception.

## System Integration

In network mode, the RS485 network is connected to an Area Controller Hub Sub-Network. Be sure to record the serial number and location of the Access Control Reader for node location entry. Refer to the system installation manual for system installation and commissioning.

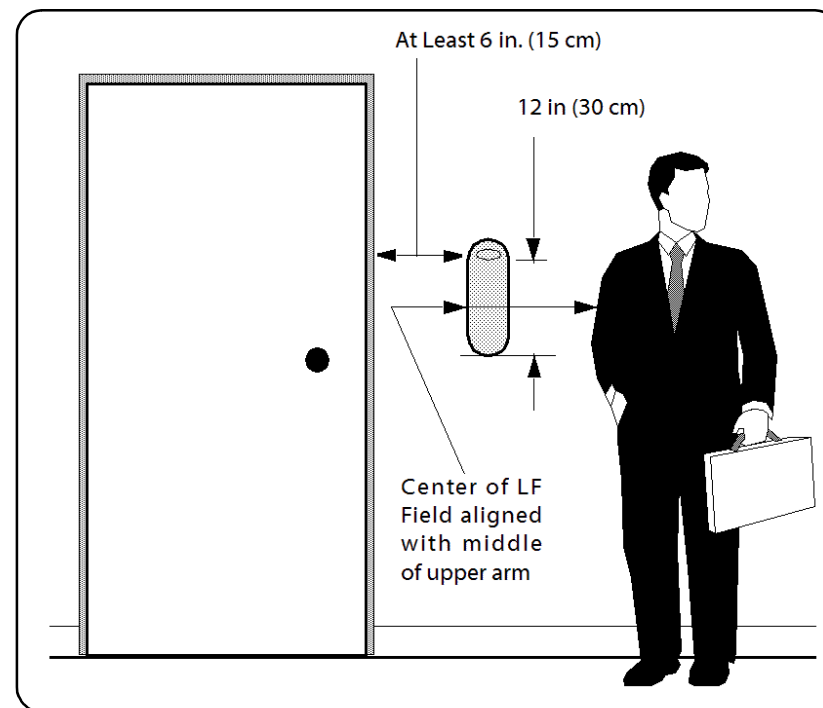
Installation and commissioning is completed by the competent contractor or a competent facility personnel. Following commissioning, no user adjustments are required at the Access Control Reader during operation.

Figure 3: LF Field Shape and Dimensions



The microchip is typically implanted in the middle of the upper right arm. For the best Antenna sensitivity, align the Center of LF Field with the microchip. This is shown in Figure 4 *Antenna Mounting Height and Position*, where the user's middle upper arm is aligned with the center of the LF field.

Figure 4: Antenna Mounting Height and Position





Antenna Orientation

The Antenna is most effective when the long axis of the Antenna is parallel to the long axis of the microchip.

Mount the Antenna so that the longest axis is vertical to the floor as shown in Figure 4 This mounting assumes that:

- ♦ The person is standing upright; and,
- ♦ The microchip is inserted with its long axis parallel to the arm.

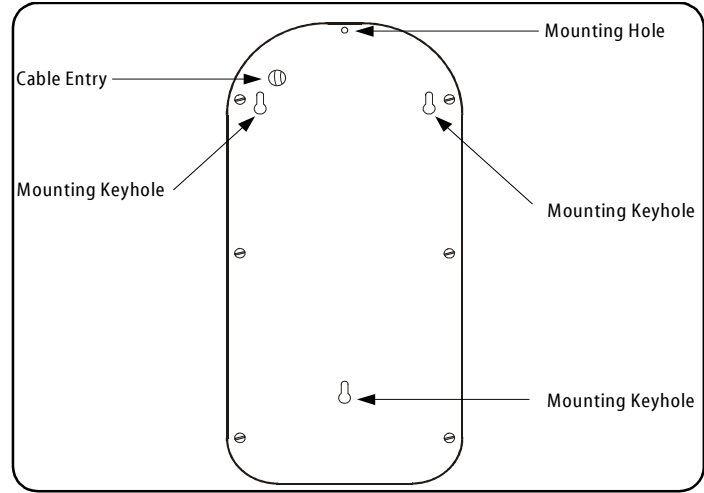
Controller Module Location Considerations

Place the Controller Module so that it will be out of sight of the facility occupants.

Mount the Controller Module so that the panel with the wiring connector and LED is accessible during installation.

Ensure that the Controller Module air vents are unobstructed.

Figure 5: Antenna Mounting Holes



Configuration

The ACR can be configured for either:

- ♦ Network Mode; or,
- ♦ Integrated Mode.

Network Mode

When operated in Network Mode, the ACR can work as part of a VeriGuard security system.

Table 5: Antenna Tuning Record

DIP Switch Number				Current
1	2	3	4	mA
OFF	OFF	OFF	OFF	
OFF	OFF	OFF	ON	
OFF	OFF	ON	OFF	
OFF	OFF	ON	ON	
OFF	ON	OFF	OFF	
OFF	ON	OFF	ON	
OFF	ON	ON	OFF	
OFF	ON	ON	ON	
ON	OFF	OFF	OFF	
ON	OFF	OFF	ON	
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ON	OFF	ON	ON	
ON	ON	OFF	OFF	
ON	ON	OFF	ON	
ON	ON	ON	OFF	
ON	ON	ON	ON	

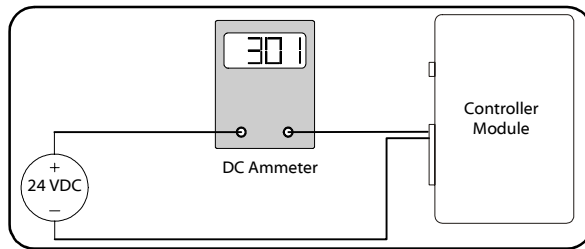
Communication Overview

The ACR sends microchip identification numbers through the Wiegand and RS232 ports and communicates via an RS485 network.

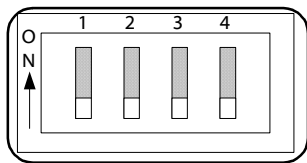
RS485

As part of a VeriChip RFID system the ACR sends the microchip identification number to the Hub and to the application server using VeriChip’s proprietary RS485 communication protocol. The VeriChip RFID system issues commands to the ACR and other components based upon its inputs and configuration.



**Figure 10: Power Supply, Ammeter, and Controller Module in Series**

- 2 Remove the label on the bulge of the Antenna. Behind the label you will find a small hole that gives access to the tuning DIP switch.
- 3 Move all the DIP switches to the OFF position as shown in Figure 11.

**Figure 11: DIP Switches in Off position**

- 4 Apply power to the ACR.
  - 5 Notice the current measured by the ammeter. Values may range from 50 mA to 360 mA.
  - 6 Start at the right hand #4 DIP switch. Turn it ON and OFF and record the position which caused the greatest current and the ammeter reading. Continue to test all the combinations of switch positions. Table 5, following, has been provided for you to record your measurements.
  - 7 Select the switch combination that causes the greatest current.
  - 8 If two settings produce the same values, use either setting.
  - 9 You have now tuned the Antenna for the best possible performance in its current location. You must now re-check its performance using a microchip. If the detection zone is large enough, replace the label covering the tuning DIP switch.
- — — — End of Procedure — — — — —

If, after tuning the Antenna, the ACR detection zone is still not adequate, you must consider modifying the current location; or, selecting another location for the ACR.

Modifying the current location could include:

- ♦ Moving the Antenna cable further from the Antenna.
- ♦ Removing any metallic objects near the Antenna.

If you move the Antenna to another location, you may need to retune the Antenna.

All three communication channels are active in Network mode. This allows the ACR to output microchip identification numbers to third party systems through both the RS232 and Wiegand ports while continuing to function as part of the VeriGuard security system on the RS485 network.

In network operation, the ACR is configured through the VeriChip application.

### Integrated Mode

When operated in Integrated Mode the ACR can automatically monitor a single access point. When the ACR reads a VeriChip implantable microchip, it transmits the microchip identification through the RS-232 and Wiegand ports.

Selecting the operating mode is the first step of the installation procedure below.

### Installation

Installation of the ACR consists of several steps. The first step is to select the operating mode.

#### Selecting Integrated or Network Mode

The operating mode can be selected using two jumpers: J4 and J5. Both jumpers are found in the middle of the Controller Module circuit board. Both jumpers have two pins and a single jumper which can be used to connect the pins.

#### ► To select Integrated Mode or Network Mode:

- 1 Open the Controller Module by removing the four screws in the top of the case. Locate the jumpers.
- 2 To select **Integrated Mode**: Connect both J4 and J5 with jumpers.
- 3 To select **Network Mode**: Remove the jumpers from J4 and J5. Store the jumpers by placing them on only one pin of each pair.
- 4 Close the Controller Module.

— — — — End of Procedure — — — — —

#### Surface Mounting on a Wall

#### ► To mount the ACR to a wall surface:

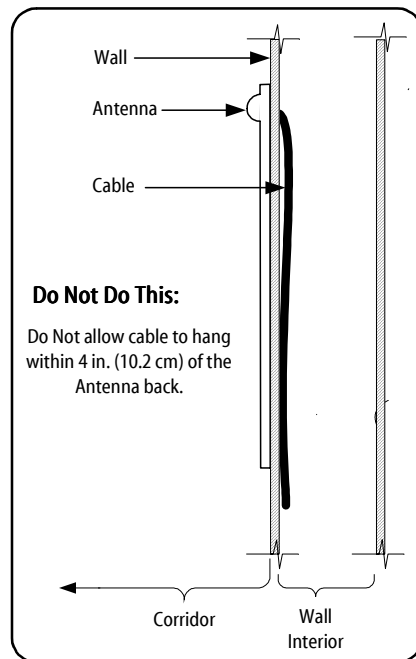
- 1 Once you have chosen a location for the Antenna, use the supplied mounting template to mark the location of the four mounting holes and one cable entry hole.
- 2 Drill the appropriate size holes for #8 screws (4.17 mm) and suitable mounting hardware for the wall material.
- 3 Drill the appropriately sized hole for the Antenna cable.



- 4 Feed the cable connector through the hole first and draw the cable up to the Controller Module. Do not connect the Controller Module at this time.
- 5 Mount the Antenna to the wall using mounting hardware suitable for the wall material.

**NOTE: Do Not allow the cable to hang within 4 in. (10.2 cm) of the Antenna back.**

**Figure 6: Incorrect Cabling**



- 6 Route the cable away from the Antenna. Ensure the cable does not kink and does not contact any electrical wires or sharp surfaces.

Figure 6 shows an incorrect method of cable routing. The metal shield of the cable will detune the Antenna when the cable and Antenna are within 4 in. of each other.

Figure 7 shows two correct methods of routing the cable. The method on the right is better than the method on the left as it draws more of the cable further from the Antenna.

Figure 8 is a variation of Figure 7. In Figure 8 the cable is led up and then in a horizontal direction either to the left or right. This again draws the cable away from the Antenna.

- 7 The cable may be loosely coiled. Tightly coiling the cable may damage it. Use a maximum of three turns over the entire cable length.
- 8 Wire the Controller Module as described in Table 2.
- 9 Connect the Antenna cable to the Controller Module.
- 10 If you have not already done so, record the location and serial number of the ACR for later inclusion on the floor plan.

— — — — End of Procedure — — — —

Use the following procedure to test the detection zone size.

- To test the detection zone size:

- 1 Bring a VeriChip™ implantable microchip slowly towards the surface of the Antenna. When the microchip signal is first acquired, the Antenna LED will flash and the Antenna buzzer will beep. When the signal is acquired, note the distance between the microchip and the Antenna.
- 2 Move the microchip a few feet away from the Antenna and wait for more than 12 seconds. Repeat Step 1.

Once the microchip signal has been acquired, the ACR will not indicate signal acquisition again until the microchip is out of range for more than 12 seconds.

- 3 Repeat the above steps several time to find the size of the LF Field.

— — — — End of Procedure — — — —

### Tools

You will need:

- ♦ an ammeter capable of reading DC milliamperes
- ♦ a small tipped tool such as a small screwdriver
- ♦ a power source for the ACR. This must supply 500 mA @ 24 VDC.

### Tuning Overview

Tuning increases Antenna efficiency and creates a larger LF Field. The increase of Antenna efficiency is measured by the ACR current draw. When the ACR current peaks, the Antenna is tuned.

Tuning is controlled by four small on-off DIP switches. You must select the switch combination that causes the greatest current draw.

- To Tune the ACR:

- 1 Mount the Antenna in location. Arrange the Antenna cable in its final position. Connect the Antenna cable to the controller. Place an ammeter capable of measuring DC mA in series between the power supply and the Controller Module. See Figure 10.



Verifying Operation

Verify power and network communications by observing the Controller Module LED. See Table 3.

Table 3: Controller Module LED and Status

LED	Status
Slow dim flashing	Power on but without network communications
Fast bright flashing	Power on with network communications

Verify ACR operation at the Antenna by observing the Antenna LED and buzzer. See Table 4.

Table 4: Antenna LED and Buzzer; and ACR Operation

LED	Buzzer	ACR Operation
ON	~	ACR power on, normal operation.
Bright Flash	Beep	A microchip enters the LF field. The ACR signals that the microchip has arrived in the field and that the ACR has acquired its unique identification number. The microchip must be outside the field for 12 seconds or more before the ACR will again signal that the microchip has entered the field; and, acquire the microchip identification number.
Flashing	~	A microchip is within the LF field. The ACR is maintaining communication with the microchip.

Tuning the ACR

The ACR will work in most installations without tuning. However, tuning features have been provided to accommodate the widest possible range of installations.

When do you need to tune the ACR?

You need to tune the ACR when it is installed near a metallic object or structure and the range of the LF Field does not provide a minimal operational microchip detection zone.

The microchip detection zone is dependent on the size of the LF Field. The largest possible LF Field extends approximately 3 in. to 4 in. from the Antenna surface depending on site conditions. If the detection zone is less than this, it is possible that tuning the Antenna may increase the LF Field size. However, Antennas are shipped tuned. So, if your LF Field size is adequate, there may not be any advantage to tuning.

Figure 7: Correct Cabling

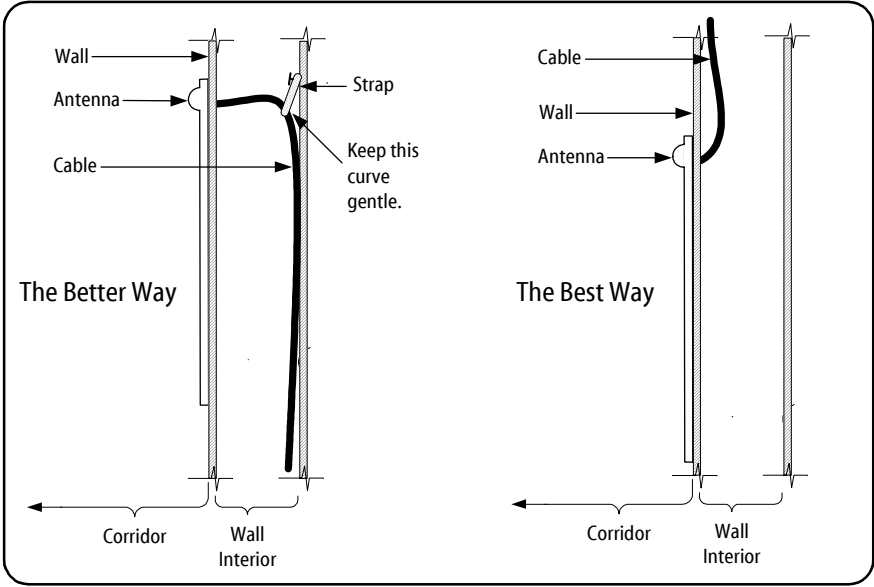
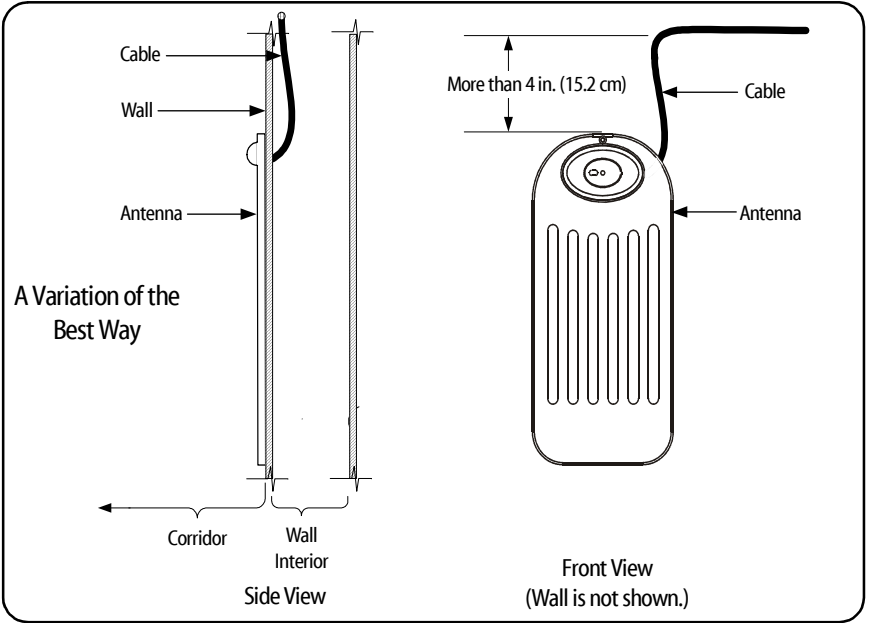


Figure 8: Variation of Correct Cabling



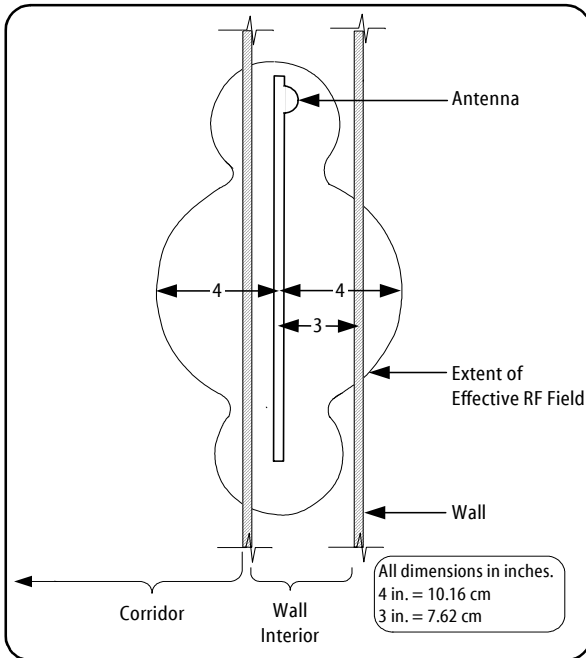


## Mounting the Antenna Inside a Wall

When the Antenna must be located inside a wall, consider the following:

- The detection zone will be smaller due to the wall thickness. You may not have a large enough detection zone on both sides of the wall. For example, Figure 9 shows an Antenna mounted inside a 4 in. (10.16 cm) wall. In the figure, only about 1 in. (2.54 cm) of the LF field extends into the corridor on the right side of the wall.
- The wall material must not contain metal that would block the LF Field.
- The Antenna must be mounted vertically to ensure an even detection zone.
- You will need to construct a mounting surface inside the wall. Do not suspend the Antenna by the cable.

Figure 9: ACR Mounted Inside a Wall



► To mount the Antenna inside the wall:

- 1 Choose locations for the Antenna and the Controller Module. Allow room on either side of the Antenna for both the Antenna bulge and the cable.
- 2 Using the supplied mounting template, construct a secure mounting surface inside the wall for the Antenna.
- 3 Mount the Antenna using #8 screws (4.17 mm).
- 4 Follow the instructions in the previous section for cable routing.

5 Use Table 2 to wire the Controller Module.

6 Before closing up the wall, test and confirm correct operation of the ACR.

— — — — End of Procedure — — — —

## Wiring the Access Control Reader

Wire the ACR using the 12 pin wiring connector as described in Table 2. (This table from page 3 has been repeated for your convenience.) See Figure 1 for the location of the wiring connector.

Table 2: ACR 12 Pin Wiring Connector

Pin #	Label	Type	Description
1	V in	DC Power In	500 mA @ 24 VDC $\pm$ 10%
2	GND	Power ground	
3	RS485+	RS485 Network	<ul style="list-style-type: none"> <li>• RS485 Sub-Network headed by Area Controller Hub.</li> <li>• 16 nodes, 230 kBytes/s</li> </ul>
4	Gnd	RS485 Ground	
5	RS485-	RS485 Network	
6	Relay N.O.	Relay Normally Open	<ul style="list-style-type: none"> <li>• 10 A 250 VAC resistive</li> <li>• Protective diodes are required for an inductive load.</li> </ul>
7	Relay COM	Relay Common	
8	Relay N.C.	Relay Normally Closed	
9	Wiegand 0	Wiegand Data 0	Standard 26-bit format (24 data bits and 2 parity bits) Wiegand output.
10	Wiegand 1	Wiegand Data 1	
11	Input	Dry Contacts	Pins 11 and 12 form an input for a door contact or other device.
12	GND	Dry Contacts	