



# TECHNICAL Practice

**TELECOM SOLUTIONS FOR THE 21ST CENTURY**

**PRX-2**

**125KHz Proximity Card  
Reader with Keypad**

November 22, 2013

## 125KHz Proximity Card Reader with Built-in Keypad

The model **PRX-2** is designed to be mounted directly to standard single-gang wall box, and integrates both a 125KHz proximity card reader and keypad into a single-unit making it ideal for applications requiring an access credential and/or personal identification number (PIN).

The proximity card reader and keypad of the **PRX-2** are both capable of transmitting data in 26-Bit Wiegand format, making it compatible with any of the Wiegand equipped Viking entry controllers. The keypad is based upon cutting-edge, non-mechanical, capacitive technology, which, unlike membrane keypads, includes no moving parts prone to early failure. Advanced keypad enhancements include fully potted circuit board (EWP), keys with blue LED backlighting, raised key outlines and pip on the 5-key.

The **PRX-2** delivers non-contact read ranges up to 6 inches (152 mm), and operates from 5 to 14 VDC. Mounting is simplified with horizontal and vertical mounting slots, which allow the reader to be conveniently adjusted and leveled. Concealing the mounting hardware, the **PRX-2** ships with both Black and Ash (Off-White) covers standard.

The **PRX-2** is equipped with Enhanced Weather Protection (EWP) for outdoor installations where the unit is exposed to precipitation or condensation. The **PRX-2** features sealed connections, as well as an epoxy potted circuit board. For more information, see **DOD# 859**.



## Features

- Read range of up to 6 inches
- Reader format: 26-bit Wiegand
- Keypad formats: 8-bit burst (default) and 26-bit Wiegand
- Technologies supported: Viking **PRX-C**, **PRX-C-ISO**, **PRX-FOB** and certain legacy HID® proximity protocols\*
- Designed for outdoor use, the **PRX-2** comes standard with Enhanced Weather Protection (EWP) (see **DOD# 859**)
- **PRX-2** is designed to meet IP66 Ingress Protection Rating (see **DOD# 859**)
- Mounts to a standard single gang electrical box
- Pigtail connection for easy installation
- Red LED shows activity
- Beep tones acknowledge key strokes
- Programmable Facility Code stored in non-volatile memory (no batteries required)
- Can be mounted directly to a metal surface

\* HID and the HID logo are registered trademarks of HID Global Corporation, an ASSA ABLOY company. All other trademarks are the property of their respective owners.

## Applications

Compatible with these Viking products:

Model	DOD#	Description
<b>AES-2000</b>	202	Accessible Entry System
<b>AES-2005</b>	204	Accessible Entry System with Video
<b>C-4000</b>	164	Apartment/Office Controller
<b>ES-1</b>	193	Stand Alone Keyless Entry System
<b>PRX-C</b>	198	Proximity Card
<b>PRX-C-ISO</b>	198	Thin Proximity Card
<b>PRX-FOB</b>	198	Proximity Key Fob

## Specifications

**Power:** 5-14V DC, 50mA - average, 115mA peak

**Dimensions:** 117mm x 77mm x 18mm (4.6" x 3.0" x 0.7")

**Shipping weight:** 0.11 kg (0.25 lb)

**Environmental:** -40° C to 65° C (-40° F to 149° F) with up to 100% humidity

**Connections:** 8" long pigtail leads, 22 gauge

**Technologies Supported:** Viking **PRX-C**, **PRX-C-ISO**, **PRX-FOB** and certain legacy HID® proximity protocols\*

**For additional Specifications, see page 3.**

## IF YOU HAVE A PROBLEM WITH A VIKING PRODUCT, PLEASE CONTACT: VIKING TECHNICAL SUPPORT AT (715) 386-8666

Our Technical Support Department is available for assistance Monday 8am - 4pm and Tuesday through Friday 8am - 5pm central time. So that we can give you better service, before you call please:

1. Know the model number, the serial number and what software version you have (see serial label).
2. Have your Technical Practice in front of you.
3. It is best if you are on site.

### RETURNING PRODUCT FOR REPAIR

The following procedure is for equipment that needs repair:

1. Customer must contact Viking's Technical Support Department at 715-386-8666 to obtain a Return Authorization (RA) number. The customer MUST have a complete description of the problem, with all pertinent information regarding the defect, such as options set, conditions, symptoms, methods to duplicate problem, frequency of failure, etc.
2. Packing: Return equipment in original box or in proper packing so that damage will not occur while in transit. Static sensitive equipment such as a circuit board should be in an anti-static bag, sandwiched between foam and individually boxed. All equipment should be wrapped to avoid packing material lodging in or sticking to the equipment. Include ALL parts of the equipment. C.O.D. or freight collect shipments cannot be accepted. Ship cartons prepaid to:  
**Viking Electronics, 1531 Industrial Street, Hudson, WI 54016**
3. Return shipping address: Be sure to include your return shipping address inside the box. We cannot ship to a PO Box.
4. RA number on carton: In large printing, write the R.A. number on the outside of each carton being returned.

### RETURNING PRODUCT FOR EXCHANGE

The following procedure is for equipment that has failed out-of-box (within 10 days of purchase):

1. Customer must contact Viking's Technical Support at 715-386-8666 to determine possible causes for the problem. The customer MUST be able to step through recommended tests for diagnosis.
2. If the Technical Support Product Specialist determines that the equipment is defective based on the customer's input and troubleshooting, a Return Authorization (R.A.) number will be issued. This number is valid for fourteen (14) calendar days from the date of issue.
3. After obtaining the R.A. number, return the approved equipment to your distributor, referencing the R.A. number. Your distributor will then replace the product over the counter at no charge. The distributor will then return the product to Viking using the same R.A. number.
4. **The distributor will NOT exchange this product without first obtaining the R.A. number from you. If you haven't followed the steps listed in 1, 2 and 3, be aware that you will have to pay a restocking charge.**

### LIMITED WARRANTY

Viking warrants its products to be free from defects in the workmanship or materials, under normal use and service, for a period of one year from the date of purchase from any authorized Viking distributor or 18 months from the date manufactured, whichever ever is greater. If at any time during the warranty period, the product is deemed defective or malfunctions, return the product to Viking Electronics, Inc., 1531 Industrial Street, Hudson, WI., 54016. Customer must contact Viking's Technical Support Department at 715-386-8666 to obtain a Return Authorization (R.A.) number.

This warranty does not cover any damage to the product due to lightning, over voltage, under voltage, accident, misuse, abuse, negligence or any damage caused by use of the product by the purchaser or others.

**NO OTHER WARRANTIES.** VIKING MAKES NO WARRANTIES RELATING TO ITS PRODUCTS OTHER THAN AS DESCRIBED ABOVE AND DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTIES OR MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

**EXCLUSION OF CONSEQUENTIAL DAMAGES.** VIKING SHALL NOT, UNDER ANY CIRCUMSTANCES, BE LIABLE TO PURCHASER, OR ANY OTHER PARTY, FOR CONSEQUENTIAL, INCIDENTAL, SPECIAL OR EXEMPLARY DAMAGES ARISING OUT OF OR RELATED TO THE SALE OR USE OF THE PRODUCT SOLD HEREUNDER.

**EXCLUSIVE REMEDY AND LIMITATION OF LIABILITY.** WHETHER IN AN ACTION BASED ON CONTRACT, TORT (INCLUDING NEGLIGENCE OR STRICT LIABILITY) OR ANY OTHER LEGAL THEORY, ANY LIABILITY OF VIKING SHALL BE LIMITED TO REPAIR OR REPLACEMENT OF THE PRODUCT, OR AT VIKING'S OPTION, REFUND OF THE PURCHASE PRICE AS THE EXCLUSIVE REMEDY AND ANY LIABILITY OF VIKING SHALL BE SO LIMITED.

IT IS EXPRESSLY UNDERSTOOD AND AGREED THAT EACH AND EVERY PROVISION OF THIS AGREEMENT WHICH PROVIDES FOR DISCLAIMER OF WARRANTIES, EXCLUSION OF CONSEQUENTIAL DAMAGES, AND EXCLUSIVE REMEDY AND LIMITATION OF LIABILITY, ARE SEVERABLE FROM ANY OTHER PROVISION AND EACH PROVISION IS A SEPARABLE AND INDEPENDENT ELEMENT OF RISK ALLOCATION AND IS INTENDED TO BE ENFORCED AS SUCH.

### PART 15 LIMITATIONS

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 instruction manual, 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.

## Specifications

**Read Range:** Up to 6 inches (152 mm)

**Input Voltage:** +5 to 14 VDC

**Current Draw:** 30 mA minimum, 50 mA typical, 115 mA peak

**LED Indicator:** Four-State Standard (Red, Green, Amber, and Off)

**Audio Tone:** Standard

**Frequency:** 125 KHz excitation

**Reader Formats:** Wiegand (26-bit Industry Standard) and ABA Track II magnetic stripe (clock/data)

**Keypad Formats:** 8-Bit Burst (default) and 26-Bit Wiegand

## Requirements

#### Cable Requirements:

The **PRX-2** can operate at up to \*500 feet (152 m) of cable, using seven-conductor, shielded, stranded cable. Per the Security Industry Association's Wiegand specification, AWG 24 (such as Belden 9537) is the minimum gauge required for data transfer in a 500-foot run length. However, the proper wire gauge to use must be determined by the current draw requirements of the reader, the length of the cable run, and the voltage applied to the reader.

If the reader is to be operated at 5 VDC, 5 VDC must be available at the reader (long cable runs have a voltage drop due to the resistance in the cable). A larger gauge of wire (having less resistance) or a separate power supply near the reader may be required to ensure 5 VDC is available at the reader.

#### Grounding:

Shield (drain) continuity must run from the reader to the access panel. Shield (drain) and reader ground must be tied together at the access panel and connect to an earth ground at one point.

#### Power:

The **PRX-2** may be powered by the access panel. As such, the reader is powered on when the access panel is powered on. However the best case is to power the reader by a separate, linear power supply.

**Voltage:** 5 to 14 VDC **Note:** For maximum read range, a minimum of 12VDC is recommended.

#### FleaPower™ Control Line:

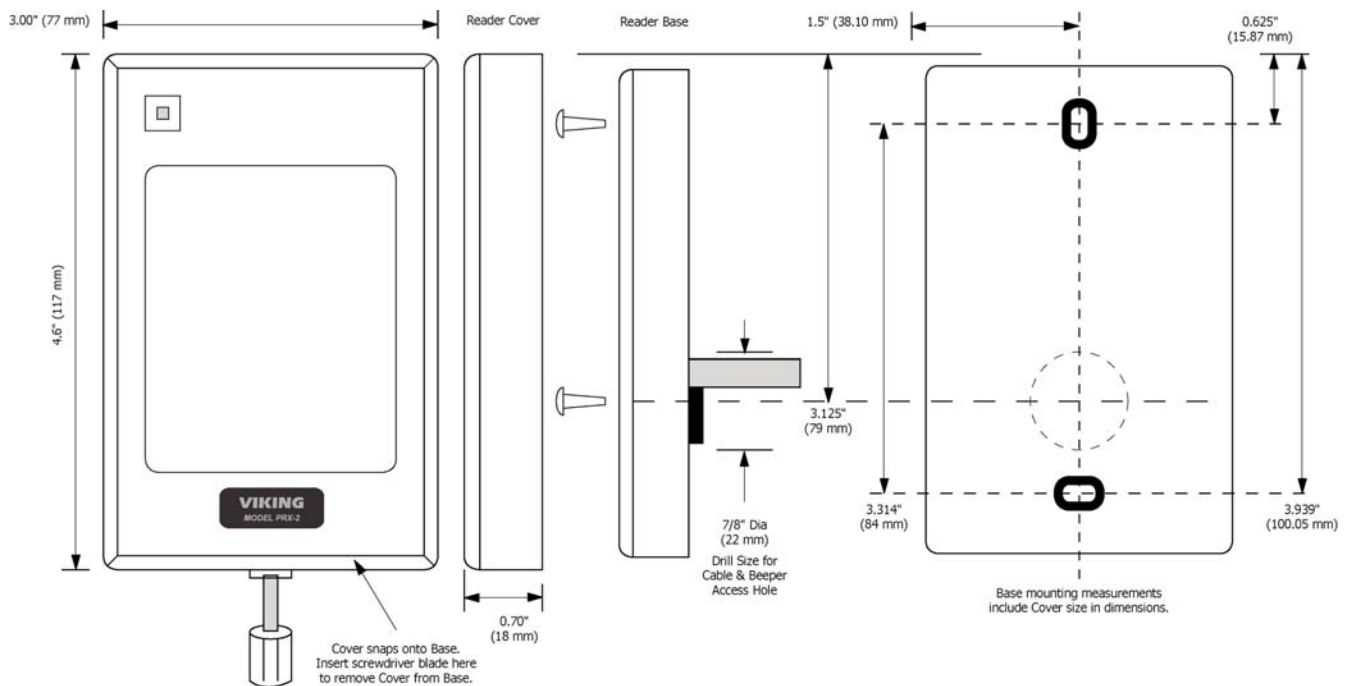
The **PRX-2** can be placed in a special lower power mode by pulling the purple colored fleaPower Control Line low. This low power mode reduces the average power required by the reader.

\* **Note:** When used with a Viking Entry System/Controller, see the Entry System's Technical Practice for the maximum wire run length.

# Installation

**Note 1:** Read range is stated in a clean RF and electrical environment using Viking proximity cards presented parallel to the reader surface with the reader operating at 12 VDC. Additionally, read range may be affected by local installation conditions. Range will be less when mounting to metal.

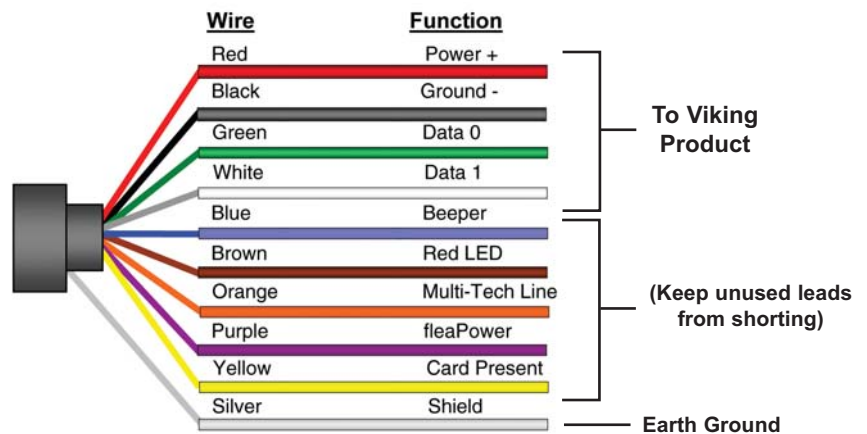
**Note 2:** For user orientation in non-illuminated environments the 5-key is always illuminated.



# Wiring

**IMPORTANT:** Electronic devices are susceptible to lightning and power station electrical surges from both the AC outlet and the telephone line. It is recommended that a surge protector be installed to protect against such surges.

**Note:** If powering the reader from its own power supply, the negative lead of the power supply must be connected to the BLACK lead on both the reader and the controller.



# Operation

The proximity reader and keypad portions of the **PRX-2** both share the Wiegand data lines. Specifically keypad data is transmitted in either an 8-Bit Burst (default) or 26-Bit Wiegand data format.

- The non-mechanical capacitive technology utilized by the **PRX-2** is optimized for use with a bare finger.
- For best operation when entering a PIN it is recommended that the user's finger be physically lifted from the keypad between key depressions. Only one key can be pressed at a time.
- For user orientation in non-illuminated environments the 5-key is always illuminated.
- Card presentation or a key press illuminates the keypad for approximately 20 seconds. Further, each key press generates a single beep and LED flash from the **PRX-2**.

## A. Keypad Output Formats

- 8-Bit Burst (factory default setting)
- 26-Bit Wiegand

The factory default Wiegand data transmission setting for the keypad portion of the **PRX-2** is 8-bit burst, though it is capable of transmitting data in the 26-Bit Wiegand mode. The keypad uses the Wiegand Keypad Data Mode control card, presented to the reader, to change between the 8-bit burst and 26-bit Wiegand data modes.

**Note:** The **PRX-2** keypad does not support magnetic stripe output.

## B. Keypad Operation: 26-Bit Wiegand Output (set unit to this mode to be compatible with Viking products)

While in the 26-Bit Wiegand mode the user's PIN is outputted by the **PRX-2** as the ID Number portion of a 26-Bit Wiegand message. As such PINs can range from 0 to 65534, with 65535 normally reserved as an error code. The facility code is programmed into the reader at set-up, while parity is calculated by the reader. The data comprising the 26-Bit Wiegand message is transmitted to the host only when the "#" key is pressed according to the Table in section E below.

### To set-up the PRX-2 in the 26-Bit Wiegand mode of operation:

1. Cycle power to the reader, and then verify the reader is powered on.
2. Present the Wiegand Data Mode control card to the reader. The reader beeps four times and then enters Facility code programming mode.
3. Enter 0 (Facility code disabled) or enter the Facility code to be applied to the keypad. The code may be set anywhere from 0 to 255 (one long beep is sounded if a facility code greater than 255 is entered).
4. Press the "#" key to exit programming mode. The reader beeps four times to indicate programming mode has ended.

**Note:** Below is a list of important facts regarding **PRX-2** operation in the 26-Bit Wiegand mode:

- The #-key must be pressed to transmit the 26-Bit Wiegand message to the host.
- Pressing the "\*" key overwrites all previous key presses. The **PRX-2** beeps four times when the "\*" key is pressed.
- There is a five second time-out between PIN entries, or entry attempts. If a timeout occurs all previous key presses are overwritten. The reader beeps four times to indicate a timeout has occurred.

## C. Keypad Operation: 8-Bit Burst Output (factory default)

While in the 8-Bit Burst mode each key press results in the **PRX-2** transmitting 8-bits of data to the host according to the Table in section E below. To return the **PRX-2** to the 8-Bit Burst mode of operation:

1. Cycle power to the reader, and then verify the reader is powered on.
2. Present the Wiegand Keypad Data Mode control card to the reader. The reader beeps four times.
3. Press the "#" key. The reader beeps four times to indicate programming mode has ended.

## D. PIN 65535

PIN 65535 is normally used as an error code. The **PRX-2** will transmit this code to the host when:

- The "#" key is pressed without any preceding digits.
- The "0" key is pressed any number of times before pressing the "#" key.
- Entering the PIN 65535, or any PIN greater than 65535.

## E. Keypad Format Tables

Bit Number	Purpose
1	Even parity over bits 2 to 13
2 to 9	Facility Code (0 to 255); Bit 2 is MSB
10 to 25	ID Number/PIN (0 to 65535; Bit 10 is MSB)
26	Odd parity over bits 14 to 25

26-Bit Wiegand Format Table (above)

Keypad Entry	Binary Data	Decimal Equivalent
0	11110000	240
1	11100001	225
2	11010010	210
3	11000011	195
4	10110100	180
5	10100101	165
6	10010110	150
7	10000111	135
8	01111000	120
9	01101001	105
*	01011010	90
#	01001011	75

8-Bit Burst Format Table (right)

# Troubleshooting

1. When the reader is powered up a victory beep (4-quick beeps) is heard and the LED stays Red.
  2. Present the correct card and the reader will beep once and LED will flash on and off. It is up to the control panel to control dual LED and have the LED turn green when an enrolled card is presented.
- If reader does not recognize the card/tag (no beep, no LED flash) or has short read range, see below for possible causes/solutions.

If any of the corrective actions mentioned right don't work, please disconnect the reader from panel and power it with a separate power supply or 9V battery and test card functionality. By powering it individually and off the installation most variables that can cause malfunction are eliminated. If after the reader is powered by a separate power source the failure persists, please contact Viking Electronics Product Support.

Possible Cause	Corrective Action
Incorrect wiring	Verify wiring connection
Not enough power	12 VDC suggested
Mounted near electromagnetic interference	Relocate or provide greater separation from
Incorrect card used	Verify card compatibility from model number
Reader/access panel not properly grounded	Quality Earth Ground needed. Verify shield line from the access panel to the reader is one continuous, connected line.
Supply generating electromagnetic interference	Linear power supply recommended

Product Support Line...715.386.8666

Fax Back Line...715.386.4345

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