ViVOpay®

8800 User Guide

Revision 1.1

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Chapter 1
Getting Started

Overview

The ViVOpay 8800 seamlessly integrates with existing POS systems and requires minimal counter space at checkout stands. The ViVOpay 8800 is a PCI 2.1 certified counter-top contactless reader with integrated color display, MSR, signature capture and PIN pad. This device features serial RS-232 and USB 2.0 communications to POS systems.

ViVOpay 8800 supports the following contactless payment applications:

- MasterCard PayPass ISO/IEC 14443 v1.1
- MasterCard M/Stripe v3.3
- Visa VCPS 2.0.2 AC 3.0 - MSD
- American Express – ExpressPay v1.0
- Discover Zip v1.0
- ViVOcard 1 & 2
- PCI Online (Master Session, DUKPT, 3DES)

This document assumes that users are familiar with their host POS systems and all related functions.

Features

The following features are supported:

- PCI 2.1 certified
- ISO14443 type A/B Mifare based contactless payment transactions
- Support for NFC devices
- PIN entry for PIN debit transactions
- Magnetic stripe card transactions
- Optional electronic signature capture
- One SAM card slot provided

Unpacking the ViVOpay 8800

The ViVOpay 8800 requires a data cable and a power supply if the data cable is not supplying power. Data cable and power supply are not included with the ViVOpay 8800. Verify that you have all the required components for the installation.

ViVOpay 8800 (P/N 540-0801-01)	
Stylus and cable (P/N 200-2515-00)	
Data cable (varies by POS and length) • Serial Data Cable (P/N 220-2463-0X) • Serial Data with Power Cable (P/N 220-2467-0X) • USB Data Cable (P/N 220-2462-0X) • USB Data with Power Cable (P/N 220-2466-0X) These cables are recommended and approved by ViVOtech to comply with FCC rules and regulations.	
Power supply, if required • US/North America (P/N 220-2476-00) This power supply recommended and approved by ViVOtech to comply with FCC rules and regulations.	

You may also need the following:

- Additional SAM card

- Four M3 screws

    If you want to secure the reader to a surface you need four M3 screws of the appropriate length (not supplied).

- Contactless test card (ViVOcard Contactless Test Card P/N 241-0015-03)

- Magnetic stripe test card

- Wedge bracket (200-2517-00), fasteners not included

The ViVOtech data cables and power supply are specifically designed to meet FCC requirements. If you are using other cables or power supply, you must install ferrites available from ViVOtech. For your free ferrite core kit with installation instructions, please contact ViVOtech support.

Overview

Before you connect and mount the ViVOpay 8800, you should plan the installation to conform to PCI 2.1 requirements and minimize radio frequency interference. Once you have determined the location and mounting of the ViVOpay 8800, you can connect it to power and the POS terminal. Finally, you should test the ViVOpay 8800 to make sure the installation is successful.

Site Planning

Two environmental considerations affect how you install the ViVOpay 8800. PCI certification has specific restrictions on how the reader is positioned to prevent PIN theft. You should also consider objects and devices near the reader that may affect the performance of the contactless radio frequency antenna.

PCI PED Compliance

The ViVOpay 8800 is a PCI 2.1 certified PIN/Debit payment device. PCI 2.1 certification requires that sufficient protection be provided to ensure that entering a PIN number CANNOT be viewed by a third party (such as another customer standing nearby, the cashier, or a security camera).

The ViVOpay 8800 has design elements, such as a recessed keypad, that meet some of these requirements. However, to fully implement PCI 2.1 make sure you consider the following.

1. The ViVOpay 8800 must be in a location that will NOT force a customer to enter a PIN that can be viewed by a third party (for example, a customer must tilt or rotate the device for better accessibility due to objects blocking a card swipe).
2. If the ViVOpay 8800 is elevated on a mounting stand, shielding must be provided on the mount to prevent a PIN being viewed by a third party.
3. If the ViVOpay 8800 is mounted on a counter top, additional shielding (which can include other devices such as a cash register as long as conditions in (1) above is met) must be provided to ensure that the PIN cannot be viewed by a third party (including cashier and security camera).

> **WARNING:** PCI requires that the device be mounted so that the PIN entry cannot be observed by a third party (such as another customer standing in line, the cashier at the counter, or a security camera mounted in the ceiling to observe the cash register area). If the PIN entry can be observed, the store owner may be responsible for any losses incurred by the customer if it can be determined that the customer's PIN was stolen at this location.

Hardware Viewing Angles

The information in this section will help you position the ViVOpay 8800 so that it conforms with PCI 2.1 requirements.

The angles in the figures below describing the line of sight to the keypad are defined as follows:

α	Angle between the horizontal plane through the 5 key and the virtual line which connects the 5 key and an observer's eye
β	Horizontal position of an observer relative to the user's position
γ	Horizontal range which is to be covered by the privacy screen
δ	Angle between the keypad plane and the horizontal plane (tilt angle)
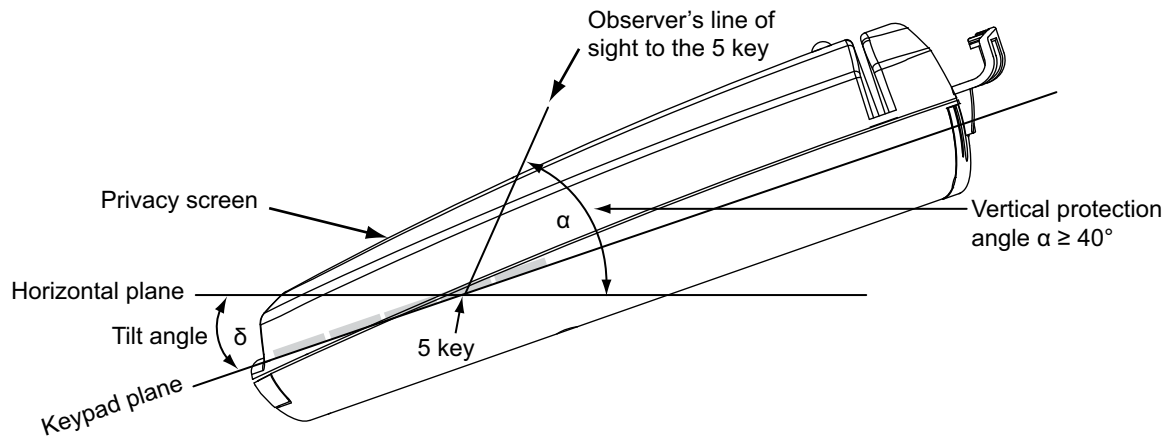
Figure 1. Vertical protection angle, sides
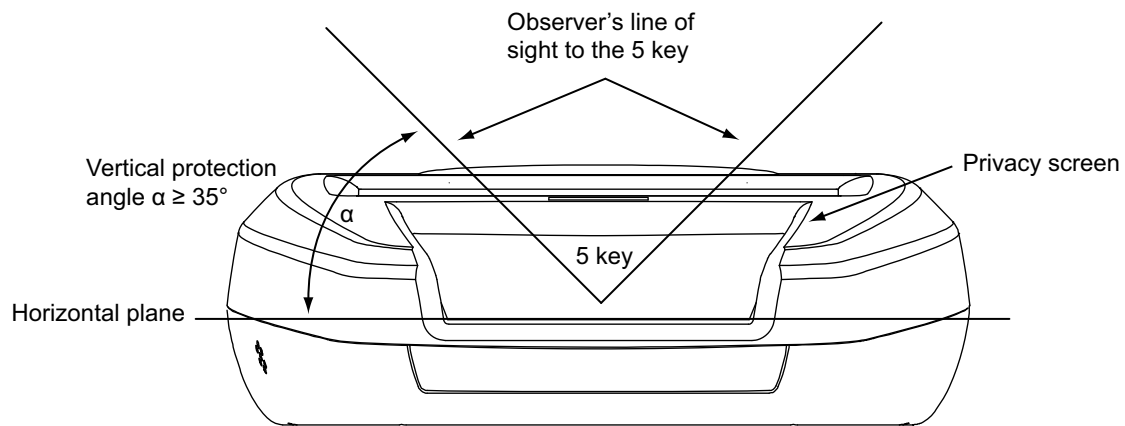
Figure 2. Vertical protection angle, top
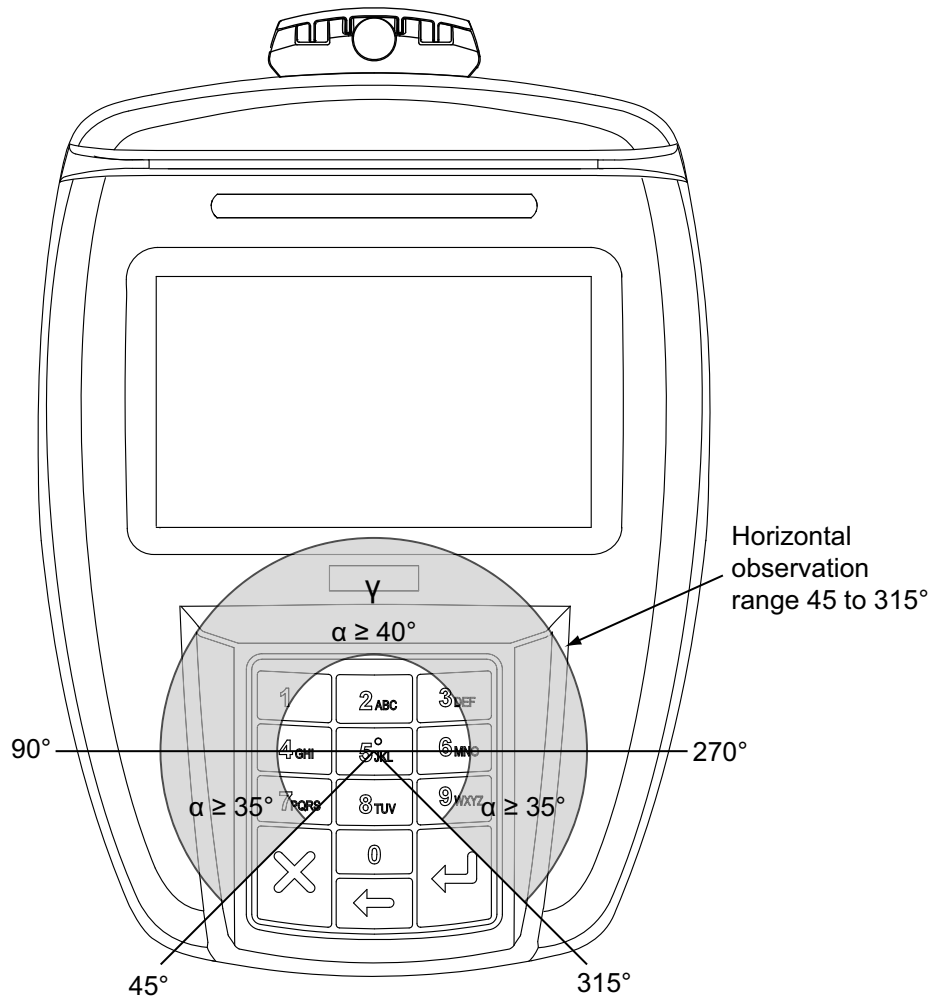
Figure 3. Horizontal protection angles

Horizontal Angle β	Remarks	Vertical Angle α
315° ≤ **β** ≤ 45°	Within this range of **β** the cardholder deters an observer with his/her body.	N/A
45° ≤ **β** ≤ 90° 270° ≤ **β** ≤ 315°	Within these ranges visual observation of the keypad is partially blocked by the cardholder. The protection angle **α** shall be at least 35°. Please note that the front end of the privacy screen must be higher if the ViVOpay 8800 is tilted.	**α** ≥ 35°
90° ≤ **β** ≤ 270°	The protection angle shall be at least 40°. The display side of the privacy screen may be lowered as the PED is tilted against the horizontal plane.	**α** ≥ 40°

Additional Shielding

At times it may be impossible to position the ViVOpay 8800 so that viewing PIN entry is blocked from all positions—especially from overhead cameras. In these instances, the cashier should advise the customer to use their other hand to block observation of PIN entry.

Verifying PCI Compliance

Before completing the installation, you must verify the ViVOpay 8800 is positioned so that the PIN entry is not visible to other customers, the cashier behind the counter, or video surveillance cameras. If PIN entry is visible, the ViVOpay 8800 must be repositioned or shielding added until PIN entry cannot be observed.

These tests usually require at least two people—one to simulate entering the PIN while the other attempts to view the keypad.

Can Another Customer View the PIN?

While one person stands at the ViVOpay 8800 with their hand positioned to enter the PIN, the other tester should try to observe the keypad from behind and beside the first person.

Can the Cashier View the PIN?

While one person stands at the ViVOpay 8800 with their hand positioned to enter the PIN, the other tester should stand behind the counter and try to observe the PIN keypad. The second tester should move around a little to see if there is a position where they can observe PIN entry.

Can the Video Camera View the PIN?

While one person stands at the ViVOpay 8800 with their hand positioned to enter the PIN, the other tester should observe what is being recorded by any video camera with a view of the ViVOpay 8800. This may require playing back a recording to see if PIN entry is visible. If the video camera is moveable, the second person should move the video camera to determine if there is a position where PIN entry can be observed.

Retesting Requirements

If PIN entry on the ViVOpay 8800 is observable in any of the above tests, you must reposition the ViVOpay 8800 and completely retest all locations to verify that PIN entry is not visible. Consider placing a display to block observation from that position.

Repositioning the ViVOpay 8800 to block observance of PIN entry at one location may expose PIN entry to observation at another location. PCI requires that you reposition the ViVOpay 8800 and retest until PIN entry is secure from observation.

Radio Frequency Interference

To perform contactless transactions, the ViVOpay 8800 uses a radio frequency antenna. The range (reading distance) and performance of the reader can be affected by other radio frequency emitters and proximity to metal.

For best performance, adhere to the following guidelines:

• Do not position the ViVOpay 8800 closer than 1 foot (30 cm) to ViVOpay 8800s or other RF-emitting devices. Some environments may require greater distances.

• Avoid placing the ViVOpay 8800 on or near large metal objects.

• Do not position the ViVOpay 8800 near radio transmitters.

Installing the ViVOpay 8800

This section describes how to install the ViVOpay 8800. The basic steps are:

- Connect to power and POS
- Mount if required
- Test the installation

Connecting the ViVOpay 8800

Accessing the Connectors

The ViVOpay 8800 connectors are beneath a cover on the bottom of the reader.

To access the connectors

1. Turn over the ViVOpay 8800 so that the connector cover is visible.
2. Use a Phillips #1 screwdriver to release the captive screw holding the connector cover in place.

3. Slide the connector cover away from the ViVOpay 8800.

Connecting Power, Stylus, and Data Cables

There are connectors for data and power inside the connector cover. There is also access to the SAM card slot if you are using this option.

To connect the ViVOpay 8800

1. Position the ViVOpay 8800 so that you can access the data, stylus, and power connectors.

2. If you are using an unpowered data cable, insert the power supply cable into the power connector. If you are using a powered data cable, you do not need a separate power supply.

3. Insert the data cable into the 10-pin RJ45 connector directly beside the power connector.

4. Connect the stylus to the square, 4-pin socket next to the data connector.

5. Pass the cables through the slots in the connector cover. Use the narrow slot for the power cable to provide strain relief.

6. Replace the cover and secure it with the retaining screw.
7. Turn the ViVOpay 8800 keypad side up.

8. Place the stylus in the holder at the back of the ViVOpay 8800.
9. Attach the data cable from the ViVOpay 8800 to the appropriate port on the POS.
10. Plug in the power supply. The ViVOpay 8800 beeps twice and the left LED illuminates. The ViVOpay 8800 may take up to 30 seconds to finish booting.

The ViVOpay 8800 displays the opening set of screens before it displays the **Welcome** screen. The opening screens include:

- ViVOtech screen
- Copyright screen
- Firmware version screen

It should then display **Welcome** or **Please present card** or similar wording, depending upon the POS application.

If the unit fails to power up, try reseating the power connector (or change to a different power outlet).

If the unit still fails to power up, try replacing the power supply. If the unit still fails to power up, and the power supply is definitely good, contact your local support representative. For more troubleshooting information, see "Troubleshooting" on page 16.

Surface Mounting the ViVOpay 8800

The ViVOpay 8800 can be mounted to a surface to prevent it from being accidently dislodged or repositioned.

To mount the ViVOpay 8800

1. Drill four 3.5mm (9/64 inch) holes in the surface where the ViVOpay 8600 will be mounted. Use the hole spacing shown in Figure 4.

76.20 mm
3.0 inches

Mounting Holes x4

76.20 mm
3.0 inches
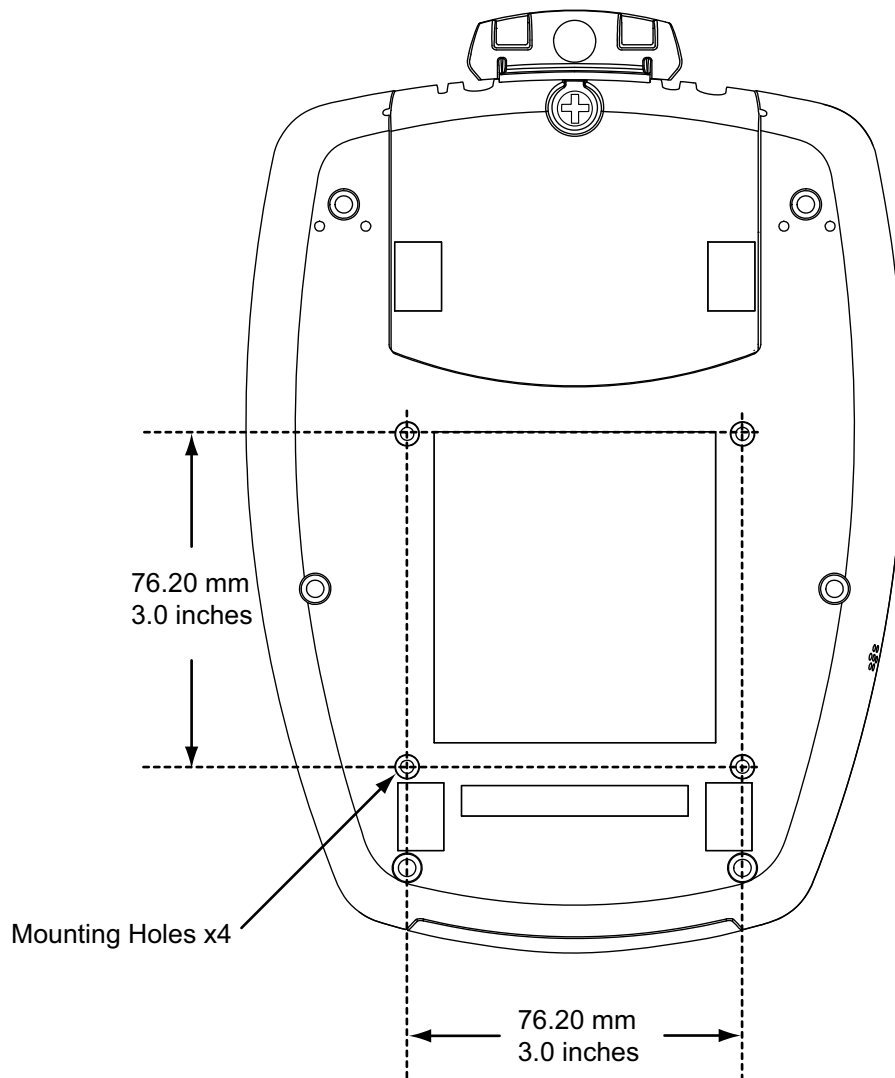
Figure 4. Mounting hole locations

2. Position the ViVOpay 8800 over the mounting holes and use four M3 screws (not supplied) long enough to secure the ViVOpay 8800 to the mounting surface.

Mounting the Wedge Bracket

The optional wedge bracket tilts the ViVOpay another 11° for greater privacy. The wedge bracket is fastened to the ViVOpay 8800 with the four mounting holes.

To mount the wedge bracket

1. Align the mounting bracket over the mounting holes with the thickest end over the connector cover.
2. Fasten in place with four M3 screws as shown in Figure 5.

Figure 5. Attaching the wedge bracket

Testing the Installation

After you have completed the installation and have checked for PCI 2.1 conformance, run the Onboard Diagnostic program as described in "Onboard Diagnostics" on page 17. Then check that the ViVOpay 8800 and the POS are communicating correctly by performing a sample transaction. The following test assumes that the host POS is already programmed to communicate with the ViVOpay 8800.

Transaction Test

The exact wording that appears on the ViVOpay 8800 depends on the POS application.

To test a transaction

1. Ring up a transaction on the POS. The ViVOpay 8800 may show **Welcome** or similar wording.
2. Present a card/fob/phone in close proximity to the reader, swipe a magnetic stripe card or insert a smart card.
3. A single beep and LED flash indicates that the card has been validated. The ViVOpay 8800 may display **Processing** or similar wording while the transaction is being processed.
4. If the POS software requires a PIN entry, you will see **Please enter PIN**. Use the keypad to enter the PIN.
5. If the POS application requires a signature, you will see **Please sign below**. Use the stylus to enter your signature on the touch screen.
6. A receipt is printed by the POS with the purchase amount. The ViVOpay 8800 may show **Thank You** or similar wording for a successful transaction.

Troubleshooting

The ViVOpay 8800 readers are reliable and easy to troubleshoot. The components that may require troubleshooting include the power supply, the reader and the data cable.

Symptom	Possible Cause	Probable Cause and Remedy
General Issues		
Reader does not appear to be powered on—no LEDs lit, no LCD display.	• Reader not powered on. • Incorrect power supply used.	• Check cable connections. • Verify that power is on and correct voltage and current are present. • Replace the power supply. • Verify that power cable plug is fully inserted. • Replace the power supply. • Replace the reader.
Reading Cards/Fobs/Phones		
LEDs do not light and beeper is not audible when card/fob/phone is presented.	• Card/fob/phone not properly presented. • Metal or RF interference. • Wrong Firmware issue (contact your local support representative). • Reader not powered on or incorrect voltage. • Incorrect power supply used. • Unsupported card/fob/phone used.	• Present card/fob/phone closer to the reader and ensure it's parallel to the reader touch screen. • Verify that the card/fob/phone is valid/current. • Test with "ViVOcard Contactless Test Card" part number 241-0015-03. • Try a different card/fob/phone. • Verify that the unit is not near any large metal objects. • Verify that correct firmware is loaded (local support representative only). • Verify that power is on and correct voltage and current are present. • Verify that power cable plug is fully inserted. • Replace the reader.
Some cards/fobs/phones read, but not all.	• Wrong firmware (contact your local support representative). • Possible bad card/fob/phone. • Unsupported card used.	• Verify that correct firmware is loaded on reader (local support representative only). • Check to see if card/fob/phone is damaged. • Try a different card/fob/phone.
On power-up, display sticks on firmware version.	SAM card isn't seated properly.	Remove power from unit, remove back cover and reseat SAM card. If unsure, contact ViVOtech Support for assistance.

Symptom	Possible Cause	Probable Cause and Remedy
Communication to POS/ECR		
No data is received, or data is garbled.	• Faulty or incorrect cable connections. • Unsupported card used. • Contactless application is not installed on terminal (for serial connections only). • Magstripe card not swiped correctly. • Magstripe card not level during card swipe. • The POS application is not using the correct communications parameters.	• Check that the cable connection is secure and in the correct port on the POS/ECR. • Check that the POS/ECR has the correct software application to accept data from the contactless reader (may need assistance from the POS vendor). • Try a different card/fob/phone or magstripe card if testing the magstripe reader. • If testing with the magstripe card, try turning the card around; make sure that the card is level during the card swipe. • Contact the payment processor for an application upgrade. • Check that the cable is correctly attached to the back of the ViVOpay 8800 • Check the POS application.

Onboard Diagnostics

Onboard diagnostics (OBD) tests the following components of the ViVOpay 8800.

Is there a smart card test?

Test	Possible Results
LCD Test	Pass/Fail
Touch Screen Test	Pass/Fail
Key Test	Pass/Fail 1234567890<cancel><backspace><enter>
LED Test	Pass/Fail
Buzzer Test	Pass/Fail
Magstripe Test	Pass Tracks 1 or 2 or 3/Fail
RFID Test	Pass Type A or B/Fail
Security Keys Test	KPK, DUKPT, Master 1234567890

Accessing the OBD Tests

To enter the onboard diagnostics

1. Power off the ViVOpay 8800 by removing the power supply from the power receptacle.
2. Plug the power supply back into the power receptacle.

3. Within 30 seconds, press the **3** key and hold it down until the **ViVOpay AR Diagnostics** screen appears. This is approximately 40 seconds after power is first applied.

```
ViVOpay AR Diagnostics

1  Test All
2  LCD
3  Touch Screen
4  Keys
5  LEDs
6  Buzzer
7  Magstripe
8  RFID and Antenna
9  Security Elements
0  Test Results Summary

X  Exit
```
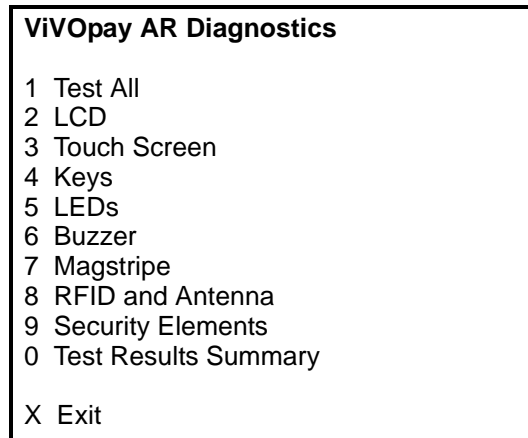
Test All

Test All runs the entire test sequence and displays the results.

1. Press **1** when the **ViVOpay AR Diagnostics** screen is displayed. All of the tests are run in sequence and the results are displayed. See each individual test for information.

LCD Test

The LCD test turns the pixels on/off and checks screen clarity to verify that the LCD screen is working properly. The results will be displayed on the LCD.

1. Press **2** from the **ViVOpay AR Diagnostics** screen. The **AR LCD Test** screen is displayed.

```
AR LCD Test

1 Test all pixels ON
2 Test all pixels OFF
3 Test clarity of display
X Exit to main menu

Select Test, then press Enter
to pass or X to fail test
```
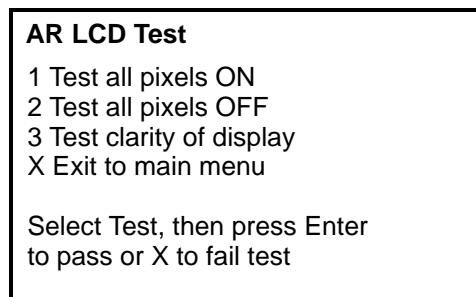
2. Press **1**. All pixels should be turned on and the screen should be a gray color. If you have a reverse video screen, the screen will be bright.
3. Press **Enter** if the correct screen is displayed otherwise press **X** to fail the test. The AR LCD Test screen is displayed.
4. Press **2**. All pixels should be turned off and the screen should be bright. If you have a reverse video screen, the screen will be dimmed.
5. Press **Enter** if the correct screen is displayed otherwise press **X** to fail the test. The AR LCD Test screen is displayed.
6. Press **3**. A checkerboard pattern is displayed.
7. Press **Enter** if the correct screen is displayed otherwise press **X** to fail the test. The AR LCD Test screen is displayed.
8. Press **X** to exit back to the main menu.

Touch Screen Test

This test asks you to touch points on the screen to verify that the screen is calibrated correctly. The touch points should be in all four coroners and the middle of the screen. The results will be displayed on the LCD.

1. Press **3** on the ViVOpay AR Diagnostics screen. The Touch Screen test is displayed.

```
┌─────────────────────────────┐
│  ┌────────┐                 │
│  │ Touch  │                 │
│  └────────┘                 │
│                             │
│   Touch Screen Test         │
│                             │
│                             │
│                             │
│                             │
└─────────────────────────────┘
```

2. Use the stylus to touch the position on the screen. After each successful touch on the screen, the touch point moves to a different location.
3. When the final point is touched, the main menu screen appears.

Keypad Test

This test asks you to enter each of the keys in sequence to verify that the keypad is working correctly. The results will be displayed on the LCD.

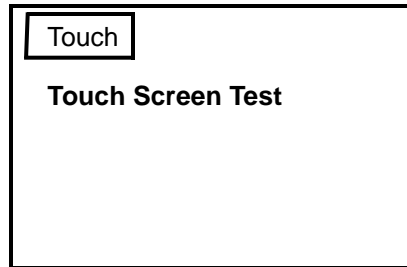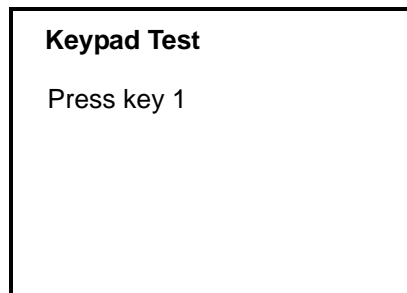1. Press **4** on the **ViVOpay AR Diagnostics** screen. The **Keypad Test** screen is displayed.

```
┌─────────────────────────────┐
│                             │
│   Keypad Test               │
│                             │
│    Press key 1              │
│                             │
│                             │
│                             │
│                             │
└─────────────────────────────┘
```

2. Press key **1**. The screen then asks for the next key in sequence.
3. Continue pressing each key as requested.
4. Press the **X** key when requested to press the cancel key (bottom left key).
5. Press the **Backspace** key when requested (yellow arrow, middle bottom key).
6. Press the **Enter** key when requested (green arrow, bottom right key).

LED Test

This test asks you to verify that all of the LEDs are working correctly. The results will be displayed on the LCD.

1. Press **5** on the **ViVOpay AR Diagnostics** screen. The **LED Test** screen is displayed.

```
        LED Test

    Press Enter if all 4 LEDs are
    turned On and OFF, press X
              if not
```

2. Press **Enter** if all four LEDs flash on and off in sequence otherwise, press **X** to indicate that the LEDs did not flash. The ViVOpay AR Diagnostics screen appears.

Buzzer Test

This test asks you to verify that the buzzer is audible. The results will be displayed on the LCD.

1. Press **6** on the **ViVOpay AR Diagnostics** screen. The **Buzzer Test** screen is displayed.

```
        Buzzer Test

    Press Enter if you hear tones
    ramp up then down, press X if
              not
```

2. Listen for the tones and make sure they ramp up and then down.
3. Press **Enter** if you hear the tones otherwise press **X** to indicate that the tones did not ramp up and down.

Magstripe Test

This test asks you to swipe a magstripe card through the slot at the top of the ViVOpay 8800 and displays the tracks read correctly. The results will be displayed on the LCD.

1. Press **7** on the **ViVOpay AR Diagnostics** screen. The **Magstripe Test** screen is displayed.
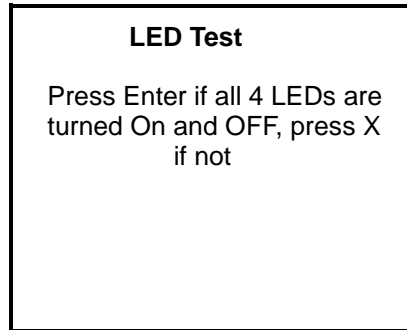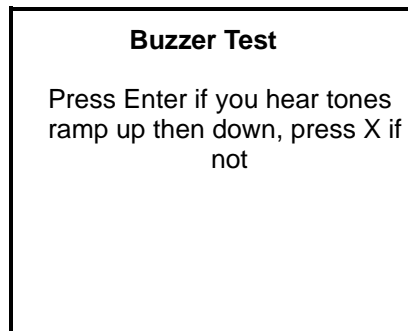
```
        Magstripe Test

      Swipe any Magstripe
              card
```

Swipe a card with a magnetic stripe through the slot on the top of the ViVOpay 8800.

2. The panel displays the results of the swipe; either the card has been successfully read or an error is indicated.

3. Press any key to return to the **ViVOpay AR Diagnostics** screen.

RFID and Antenna Test

This test asks you to present a contactless card/phone/fob close to the touch screen to verify that the antenna is able to detect a contactless card. The results will be displayed on the LCD.

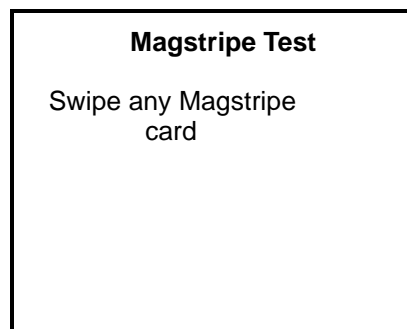1. Press **8** on the **ViVOpay AR Diagnostics** screen. The **RFID Test** screen is displayed.

RFID Test
Present any RFID card
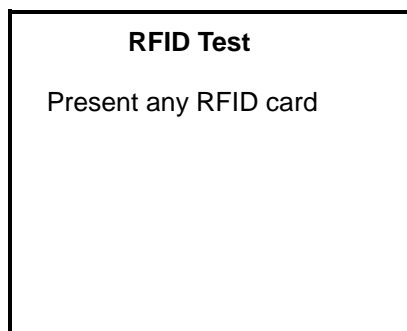
2. Present the card/fob/phone in close proximity to the reader and so that maximum surface area is parallel to the touch screen. The screen indicates if a card/phone/fob has been detected.

3. Press any key to return to the ViVOpay AR Diagnostics main menu.

Security Elements Test

This test verifies that the KPT and DUPKT keys are loaded into the ViVOpay 8800. It also verifies which slot contains the master Key. The results will be displayed on the LCD.

1. Press **9** on the **ViVOpay AR Diagnostics** screen. The **Security Elements Test** screen is displayed.

```
         Security Elements

KPK Exists
DUPKT exists
Master session slots occupied
- - - - - 6 - - - -


     Press any key to continue
```
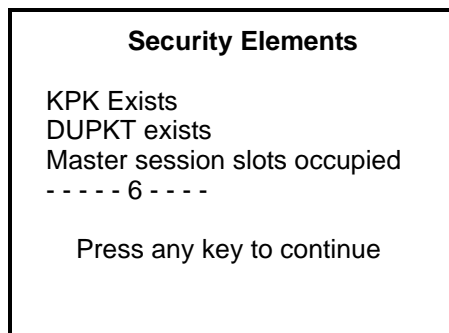
2. Press any key to return to the **ViVOpay AR Diagnostics** main menu.

Test Results Summary

The **Test Results Summary** displays the results of all tests performed. Once the ViVOpay 8800 is returned to normal mode, all results are cleared. If you reenter the **ViVOpay AR Diagnostics**, all test are marked as not performed.

1. Press **0** on the **ViVOpay AR Diagnostics** screen. The **Test Results** screen is displayed with the results of all the tests run.

```
        Test Results

LCD            Pass
Touch Screen   Pass
Keypad         Pass
LED            Pass
Buzzer Test    Pass
Magstripe      Card T1 T2 T3
RFID           Type B card
Security
  KPT exists
  DUKPT exists
  Master session slots occupied
  - - - - - 6 - - - -
Press any key to return to main
```

Maintenance

The ViVOpay 8800 contains no user-serviceable parts within its enclosure. Do not open the ViVOpay 8800 enclosure.

> **WARNING:** Attempting to open the ViVOpay 8800 enclosure will trigger PCI security measures and it will stop functioning even after reassembly!

You can replace the stylus without violating PCI security measures. You can also upgrade the ViVOpay 8800's firmware if required.

Replacing the Stylus

It is important that only the stylus be used for writing on the touch screen. If the stylus is lost or the lanyard broken, you can obtain a replacement from your ViVOpay 8800 distributor (P/N 200-2416-00).

To replace the stylus

1. Turn the ViVOpay 8800 upside down and unscrew the connector cover retaining screw.

   You must place upward tension on the screw to remove it completely from the connector cover.

2. Remove the old stylus if needed. The connector has a locking tab you must squeeze to remove the stylus connector.

3. Connect the new stylus to the ViVOpay 8800.

4. Replace the cover as described in "Connecting Power, Stylus, and Data Cables" on page 9.

5. Turn the ViVOpay 8800 right side up and place the stylus in its holder.

Upgrading the Firmware

You can upgrade the firmware of the ViVOpay 8800 if required for your application. You will need the following from your ViVOpay 8800 distributor:

- New ViVOpay firmware

  ViVOpay download utility

  USB data cable

You also need a PC with a USB port. The PC should have the required USB driver USBSER.SYS and HID.DLL files. If not, they are available for download from Microsoft's website.

To upgrade the firmware

1. Make sure you have the USBSER.SYS and HID.DLL files installed on the PC.
2. Copy the firmware image and ViVO download utility to the PC you are using for the upgrade.
3. Copy the vivopay.inf file to the Windows\inf directory.
4. Connect the USB data cable to the ViVOpay 8800 and PC (see "Connecting Power, Stylus, and Data Cables" on page 9).
5. Double click the ViVOpay download utility icon or .exe to start the utility.
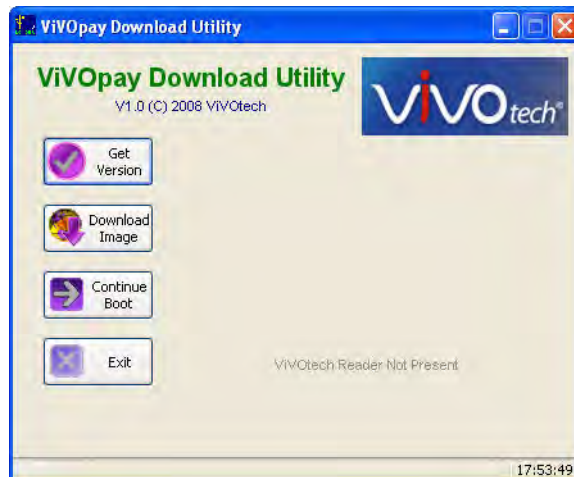
6. Power on the ViVOpay 8800. The bootloader version appears under the ViVOtech logo.
7. Click **Download Image**.
8. When prompted, locate and select the firmware (.hex file) to download and click **OK**.

   A progress bar indicates the status of the download. It will take approximately eight minutes to complete the download.

9. When the download is complete disconnect the ViVOpay 8800 from the PC and power.

   The new firmware will be active next time you apply power to the ViVOpay 8800.

10. Connect the ViVOpay 8800 to the POS with the appropriate data cable.
11. Reconnect power.

ViVOpay 8800 Specifications

For detailed specifications, see the *ViVOpay 8800 Technical Specifications*.

RF Interface	
Frequency	13.56 MHz
Standard	ISO 14443 Type A/B
Physical	
Length	215.4 mm (8.48 in)
Width	149.2 mm (5.87 in) maximum
Depth	51.1 mm (2.01 in)
Weight	0.57 Kg (1.25 lbs)
Environmental	
Operating Temp.	0 to 40° C (32 to 104° F)
Storage Temp.	-10 to 70° C (-14 to 158° F)
Relative Humidity	10 to 85% non-condensing
Operating Environment	Indoor only
Power	
Voltage	9-12 Vdc regulated, +/- 10%
Consumption	13.5 W maximum

Regulatory Compliance

FCC Part 15 Class B Equipment

This equipment has been tested and found to comply with the limits for a 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, uses 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.

FCC Information for User

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. In cases where the manual is provided only in a form other than paper, such as on a computer disk or over the Internet, the information required by this section may be included in the manual in that alternative form, provided the user can reasonably be expected to have the capability to access information in that form.

Industry Canada Class B Equipment

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

Industry Canada Information for User

Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Electronic Cash Register (ECR)

The combination of a traditional cash register and a POS terminal, often PC-based.

ExpressPay from American Express

American Express contactless payment product that utilizes contactless technology.

Firmware

Software that is embedded in a hardware device that allows reading and executing the software, but does not allow modification, e.g., writing or deleting data by an end user.

Example: Firmware is a computer program in a read-only memory (ROM) integrated circuit chip. A hardware configuration is usually used to represent the software.

Example: Firmware is a program embedded in an erasable programmable read-only memory (EPROM) chip, which program may be modified by special external hardware, but not by an application program.

Fob

A key chain device or other non-standard credit card sized form factor that has an embedded radio frequency (RF) chip.

MasterCard PayPass

MasterCard's contactless payment product that utilizes contactless technology.

NFC

Near Field Communications.

NFC Phone

Near Field Communications (NFC) phone. A technology that enables communication between a secure element in a mobile device and a contactless reader to make credit/debit payments. Also see UICC.

PCI 2.1

The Payment Card Industry Security Standards Council (PCI SSC) mission is to enhance payment account data security. PCI 2.1 is a set of standards created by PCI SSC to increase the security of card data.

Point of Sale (POS)

Refers to terminals used in retail stores with a magnetic stripe reader, keyboard, display and autodialer modem or IP connection, connected to the telephone/internet network and used for on-line credit/debit authorization. Can also be connected to a host computer, which handles all transaction processing including item price look-up, data collection, and credit/debit authorization.

Proximity Payments

Payment method utilizing contactless technology such as RF, Infrared (IrDA) or Near Field Communications (NFC).

Radio Frequency (RF)

Any frequency that corresponds to radio signals, including those used by cellular telephones and wireless networks.

RF Reader

The Point of Sale device that receives the RF transmission from a card, fob or NFC phone.

Visa Contactless

Visa's contactless payment product that utilizes contactless technology.