

OPN2005/OPN2006/PX20

Bluetooth Application Manual

Version RFL3791C (OPN2005) / RFM3791C (PX20) /
RFN3791C (OPN2006)

28/1/2016

Opticon Sensors Europe BV

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CAUTION: This information is subject to change without prior notice.

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THE GENERAL USE AND FUNCTIONING OF THE BAR CODE SCANNER IS DESCRIBED IN THIS DOCUMENT. ALSO GENERAL SETUP INSTRUCTIONS TO GET STARTED ARE DESCRIBED IN THIS DOCUMENT. FOR FURTHER INSTRUCTIONS CONSULT OPTICON OR YOUR LOCAL DEALER.

Overview

The OPN2005/6 and PX20 barcode terminals are, by default, supplied with this Bluetooth demo application that demonstrates the devices' Bluetooth capabilities. Since both terminals don't have a display to show instructions nor have a keyboard to change the settings, a user interface is implemented that consists entirely of using just the two keys and reading barcodes. This brief setup guide describes the features as well as instructions to be able to use this demo application.

More product details, additional support or configuration options to your own preferences (by Universal menu book) will be updated at www.opticon.com

Information about how to install and use a Bluetooth stack on your remote device, like a PC or mobile device, please check the manual of your Bluetooth device.

Capabilities

The following features are currently supported:

- Connecting to a remote host device (as master) and transmitting data using a Bluetooth virtual COM port (VCP)
- Making the barcode scanner connectable and discoverable (as slave) to allow a remote host device to connect with the barcode scanner, enabling the transmission of data using a Bluetooth virtual COM port (VCP)
- Making the barcode scanner connectable and discoverable (as slave) as an HID (keyboard) device to allow the remote host device to connect, whereupon it transmit each character of barcode data as keyboard presses
- Reconnecting to a paired remote host device (as master) to quickly reestablish a lost Bluetooth HID connection without having to redo the pairing.
- Secure Simple Pairing, which allows the OPN2005/6 and PX20 to pair with a remote host device without the user having to enter a PIN code
- Opticon Universal menu book support to configure barcode decoders, prefixes and suffixes, read modes, buzzer/LED settings, Bluetooth configurations, and switching between HID or VCP as the Bluetooth interface
- Use of the trigger and clear key to quickly (re)connect, disconnect and make discoverable
- Storing of settings in non-volatile memory to allow all settings to be restored after a reset
- Configuration of the application by using Opticon serial commands
- Easy software upgrading by USB-VCP using Appload.
- iPhone / iPad compatibility
- USB-VCP and USB-HID support when not connected to Bluetooth
- Low battery warning and battery check

Configuration

Minimum required Operating System (OS) version

This Bluetooth application requires the following minimal OS version:

- **OPN2005:** RBLV0035
- **OPN2006:** RBNV0035 (*and Boot loader RANV0014*)
- **PX20:** RBMV0035 (*and Boot loader RAMV0012*)

If you want to check the currently installed OS and application version it is possible to transmit both versions by USB-VCP by reading the 'Z1' menu label (See Universal menu book chapter 7). It's also possible to use Appload (Utilities > Show software version) to check the OS version.

Software updates





In the future more features and bug fixes are likely to be implemented into the OS and this application. To find out if there are software updates available, please check our website. All available software and documentation can be found under:

'Service and support' > 'Software' / 'Manuals' > OPN2005/6 / PX20 at www.opticon.com.

Supported defaults





The following default settings are supported.

(The labels below can be read without reading any SET/END labels)

Bluetooth HID * <i>(default)</i>	 C02	
Bluetooth VCP *	 C05	

** If you only have an Opticon Universal menu book available which doesn't list 'C02' or 'C05' as supported defaults, it's possible to use RS232 ('U2') or Bluetooth ('SO') instead of 'C05'.*

In case it's required to (also) be able to transmit any scanned barcodes using USB-VCP (COM port) or USB-HID (keyboard), then it's possible to do this by reading one of the labels below.

USB-VCP <i>(+ Bluetooth VCP)</i>	 C01	
USB-HID <i>(+ Bluetooth HID)</i>	 SU	

Notes:

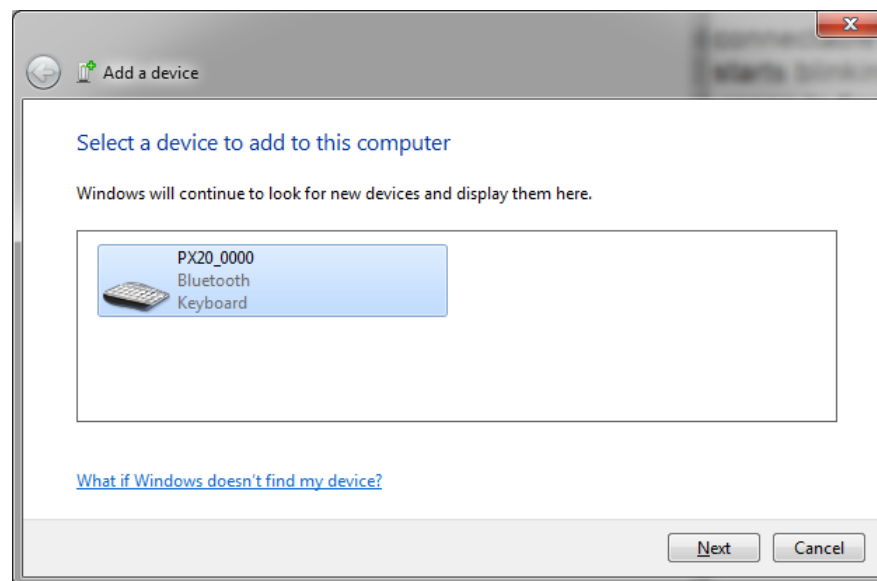
- When using USB-HID it's not directly possible to load software using Appload. To be able to load software, switch back to Bluetooth-VCP or USB-VCP default.
- Transmission by USB only works while not being connected to Bluetooth.

Connecting your OPN2005/6 and PX20 as Bluetooth keyboard (HID)

The first step of connecting your device as Bluetooth keyboard to a remote host device is to make sure the Bluetooth HID default is configured (see 'Supported defaults').

When using Bluetooth HID, the remote host device always has to make the first connection attempt. Therefore it is not necessary to configure the remote Bluetooth address, but you will have to make your barcode scanner discoverable and connectable to allow the remote device to find, pair, and connect to your device.

To make your device discoverable and connectable keep the clear key pressed for 5 seconds till the blue LED starts blinking. When this is done, let your remote device discover all Bluetooth devices in range to find your barcode device. The OPN2005/OPN2006/PX20 will remain in this state for 2 minutes.



Screenshot of a PX20 that has been discovered on a remote host PC.

After you've discovered your device you can tell your remote host device to connect with it.

Depending on your Operating System, Bluetooth stack, and supported Bluetooth version, you will either be asked to enter a PIN code on your remote host device, you will be shown a random PIN code to enter with the barcode device or you won't be prompted for a PIN code at all.

If you are allowed to enter any PIN code, then it is easiest to choose the last 4 digits of the Bluetooth address of your device as the PIN code, since that is already set as the default PIN code. Scan the 'Fixed PIN code' label below to configure this. To change this configuration back to default again (i.e. entering the PIN code manually) you can read the other label.



] F P I N



Use fixed PIN code














] M P I N



***Enter PIN code manual
(using numeric direct input labels)***

If you want to use a different PIN code, or if you are only allowed to enter a random PIN code on your device, then you will have to enter this PIN code using direct input labels below. These labels can be found in the Universal Menu Book as well. After scanning each number of the PIN code, scan the END label to send the PIN code to the remote device.

Direct input numeric 0		Q0
Direct input numeric 1		Q1
Direct input numeric 2		Q2
Direct input numeric 3		Q3
Direct input numeric 4		Q4
Direct input numeric 5		Q5
Direct input numeric 6		Q6
Direct input numeric 7		Q7
Direct input numeric 8		Q8
Direct input numeric 9		Q9
END		

When executed correctly your device should now be connected and you should be allowed to scan and transmit barcodes into any document or application that accepts keyboard input. If the remote device does establish the pairing, but doesn't automatically connect, you might have to manually connect afterwards by pressing the trigger key for 5 seconds.

To manually end a connection you can press the clear key for 5 seconds to disconnect your device.

If you've lost your connection, then your device will try to reconnect automatically for about 1 minute, but if that fails you can reconnect manually by pressing the trigger key for 5 seconds. The trigger key allows you to reconnect without having to enter the PIN code again as long as the remote device doesn't lose the pairing information and the OPN200x / PX20 wasn't reset to default (or the remote Bluetooth address wasn't changed).

If the pair was ever lost or you want to connect to another remote device you will have use the clear key again to make your device connectable and allow the remote device to connect and pair with it.

Connecting your OPN2005/6 and PX20 as a Virtual Com port (VCP)

The first step of connecting your device as a Bluetooth Virtual Com Port to a remote host device is to make sure that Bluetooth VCP default is configured (see 'Supported defaults').

When using Bluetooth VCP, the remote host device can either connect to your OPN200x / PX20 (slave mode) or your OPN200x / PX20 can connect to the remote device (master).

Configuring a remote Bluetooth address

If you want your device to connect to a remote host device (as master) it will be necessary to configure the Bluetooth address of the remote host device first.

Usually the address is displayed on the product label as a hexadecimal code (example: 00-11-F6-03-39-69). Otherwise consult the documentation of the device to learn how to retrieve the Bluetooth address. To configure this Bluetooth address in the OPN200x / PX20 you'll have to create a barcode label containing this hexadecimal code as described below.

Opticon provides a simple online application for this purpose:

<http://opticonfigure.opticon.com/bluetooth.asp>

- Type in the digits of the hexadecimal code in numbers and capital characters without dashes, dots, and spaces (example: 0011F6033969).
- Submit the code into a barcode and print the screen to have it available for scanning.

After you've created the barcode, you can scan the barcode to configure the Bluetooth address and save it in non-volatile memory. (The OPN200x / PX20 will automatically try to establish a Bluetooth connection when reading this label).

Connect as master

Depending on the Operating System and Bluetooth stack of your desktop computer, laptop, or mobile Bluetooth device, it is necessary to first open the (incoming) Bluetooth Virtual COM port, before you will be able to connect your OPN200x / PX20 as a master to your remote host device. Using applications like Hyperterminal or the RS232 monitor of Appload, it is possible to open the Bluetooth Virtual Com Port prior to the connection attempt. For more information on how to open a COM port, please refer to documentation of your remote host device.

The first time you try to connect your OPN200x / PX20 to a Bluetooth device you will have to scan the Bluetooth address label created and described in the prior section. After that, it will also be possible to repeat a connection attempt by holding the trigger key for 5 seconds (until the blue LED starts blinking). It should be noted too that if you first connect with the OPN200x/PX20 functioning as a slave device, any subsequent connections can be formed by holding the trigger key for 5 seconds.

If you haven't disabled authentication on your remote host device, and your remote host device doesn't use Bluetooth 2.1+, then you will be requested to enter a PIN code (or passkey) during pairing. The default PIN code of the OPN200x / PX20 equals the last 4 digits of the Bluetooth address. These last 4 digits of the Bluetooth address are also shown in the Bluetooth name. If you wish to use a different PIN code, then this is possible by using the 'Set/end PIN-code label' menu options, which can be found in chapter 2.3.2 of the Universal Menu Book.



Example of a request on a Windows device to enter a passkey (a.k.a. PIN-code)

When executed correctly your device should now be connected as Virtual Com port to your remote device and you should be able to scan and transmit barcodes as serial data.

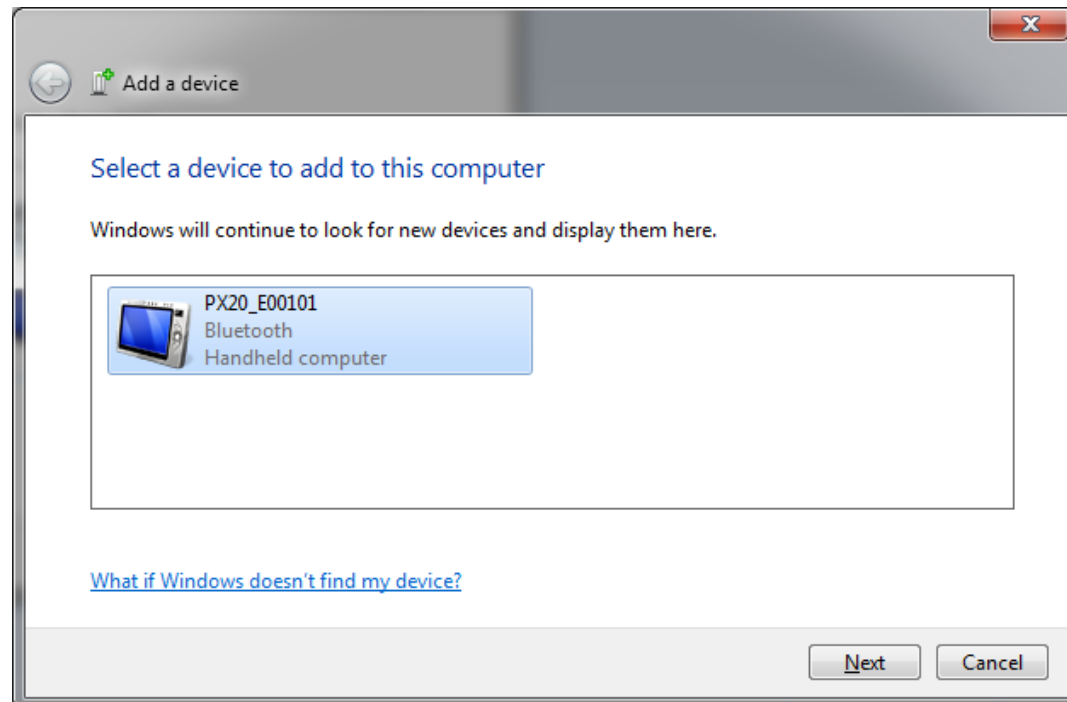
If you've lost your connection or closed the Virtual Com port, then the OPN200x / PX20 will try to reconnect for about 1 minute. After that you can reconnect manually by pressing the trigger key for 5 seconds. To change this auto reconnect time, use the menu options found in chapter '2.3.6 Auto reconnect options' of the Universal menu book.

To manually end your connection you can press the clear key for 5 seconds to disconnect.

Connect as slave

When you want a remote Bluetooth device to connect with your OPN200x / PX20, then it's not necessary to configure the remote Bluetooth address, but you will have to make your device discoverable and connectable to allow the remote device to find and connect to your OPN200x / PX20.

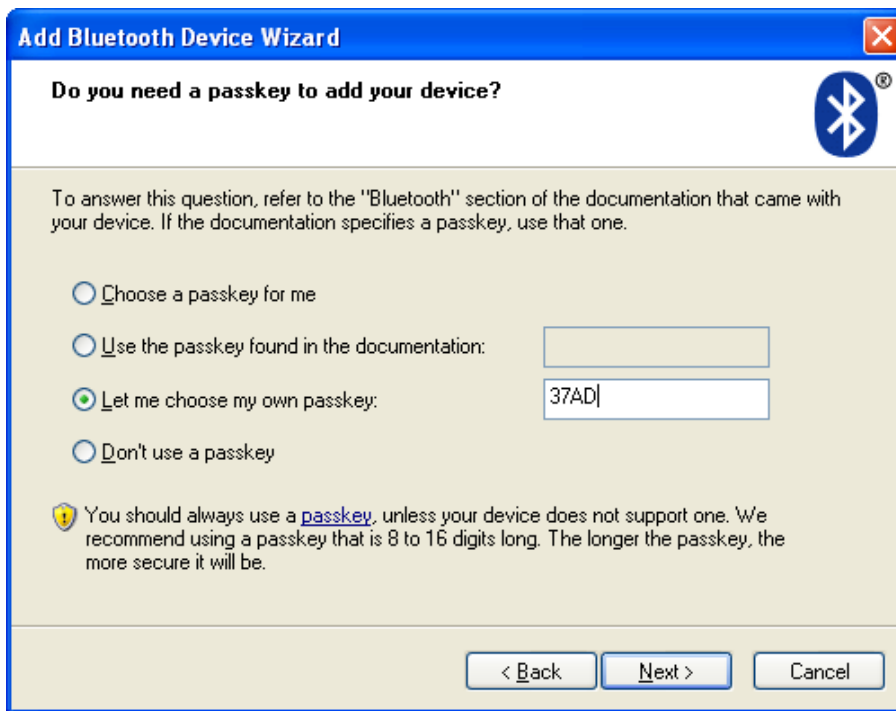
To make your OPN200x / PX20 discoverable and connectable for 2 minutes, keep the clear key pressed for 5 seconds until the blue LED starts blinking. After that you should let your remote device discover all Bluetooth devices in range to find your bar code device.



Screen shot of a discovered PX20.

After you've successfully discovered your OPN200x / PX20 you can pair it with your remote host device.

If you haven't disabled authentication on your remote device, or your remote host device doesn't support Bluetooth 2.1+, then you will be requested to enter a PIN code (or passkey) on your remote device. The default PIN code of the OPN200x / PX20 equals the last 4 digits of the Bluetooth address. These last 4 digits of the Bluetooth address are also shown in the Bluetooth local name. If you wish to use a different PIN code, then this is possible by using the 'Set/End PIN-code label' menu options, which can be found in chapter 2.3.2 of the Universal Menu Book.



Screenshot of entering a passkey (a.k.a. PIN-code) on a Windows device






If successful, the OPN200x / PX20 should now be successfully paired with your remote Bluetooth device and the Virtual Com port will be ready to be used.

To be able to scan and transmit barcodes as serial data, open the Bluetooth Virtual Com port on your remote device to establish the connection with your device. You can open this Bluetooth Virtual Com port with an application such as HyperTerminal or Appload's RS232 Monitor.

If you've lost your connection or closed the Virtual Com port, then the OPN200x / PX20 will stay connectable for about 2 minutes*. This will allow you to open the Virtual Com port on the remote host device to reconnect. After those 2 minutes, use the small key to make the OPN200x / PX20 connectable again. Also open the Virtual Com port on the remote host device to allow the remote host device to re-establish the connection.

To manually end your connection, press the clear key for 5 seconds to disconnect your barcode device.

** The labels below allow you to change the time that the device will stay connectable*

 CT02	Discoverable/connectable time: 2 minutes
 CT04	Discoverable/connectable time: 4 minutes
 CT06	Discoverable/connectable time: 6 minutes
 CT08	Discoverable/connectable time: 8 minutes
 CT10	Discoverable/connectable time: 10 minutes

Universal Menu Book support

The OPN200x and PX20 support the reading of various configuration options that can be found in the Universal Menu Book. This makes it possible to customize the behaviour of the embedded application without having to actually change the source code of the application.

The OPN200x and PX20 support the menu options listed in the following chapters:

- 1. Defaults (See chapter 'Supported defaults' at the start of this set-up guide)
- 2.3. Bluetooth options (See 'Supported Bluetooth features' below)
- 3.1 Enabling/disabling readable codes
- 3.2 Setting of fixed, minimum and maximum lengths
- 3.3 Code specific options (almost all options are supported except some 2D decoder options)
- 4.1 Case conversion
- 4.2 Set prefixes
- 4.3 Set suffixes
- 5.1 Read modes, add-on wait modes
- 5.1.1 Multiple read reset time
- 5.1.2 Quiet zone options (margins)
- 5.2. Read time options
- 5.4 Redundancy
- 5.5 Positive and negative barcodes
- 6.1 Buzzer settings
- 6.2 Good read LED
- 7.1 Diagnostics
- 7.2 Enabling / disabling configuring via serial commands

Supported Bluetooth features

In the Opticon Universal Menu Book there are additional Bluetooth features listed for Opticon barcode readers with Bluetooth support. Some of these features are also available in this demo application.

The following of these listed features are supported:

- Chapter 2.3.1: Bluetooth connection labels
 - +-CONN-+ (Manually connect label)
 - +-DISC-+ (Manually disconnect label)
 - +-DSCO-+ (Make discoverable / connectable)
- Chapter 2.3.2: Bluetooth security (Authentication / encryption)
- Chapter 2.3.3: Configurable Trigger-to-connect time (default = 3 seconds)
- Chapter 2.3.4: Configurable Trigger-to-disconnect time (default = 5 seconds)
- Chapter 2.3.6: Auto reconnect options (default = 1 minute)
- Chapter 2.3.7: Wireless power saving options

Apple iPhone/iPad support

When iPhone/iPad mode is enabled it's possible to toggle the iOS onscreen keyboard and use the trigger key to wake up the iPhone/iPad from standby. It is recommended to disable the passcode lock option to prevent barcodes from being entered as a passcode when waking up from standby.





Enable iPhone/iPad mode

Disable iPhone/iPad mode

Read one of the labels above to enable/disable iOS compatibility.

Memorizing

This application supports memorizing of barcodes in case the OPN200x or PX20 loses its connection with a remote Bluetooth device. This will allow barcodes scanned to be saved in memory and be transmitted when a connection is re-established.

If memorizing is desired, see Section 2.3.8 of the Universal Menu Book.

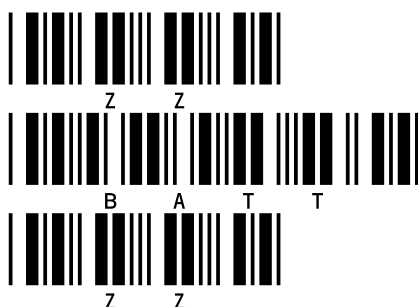
Other Features

The OPN200x/PX20 will show an orange LED 10 times for 1 minute when the battery is too low for normal operation. After this, the device will shut off automatically. If this indicator is seen, it is imperative that the device be attached to USB to charge the battery.

The current battery percentage level can be checked by sending the following serially:

<ESC>]BATT<CR>

When the device is in Bluetooth VCP or USB-VCP mode. In HID mode, the following codes can be scanned:



Other OPN2005 / OPN2006 / PX20 applications

Besides this Bluetooth demo application there are 3 other applications available on our website that might fit your specific use case better.

Software V3727x: OPN2001 simulation demo application

This application turns the OPN200x/PX20 into an OPN2001 compatible batch scanner.

Besides USB, any stored barcode data can also be retrieved from the barcode scanner by using Bluetooth.

Use this application in combination with the OPN2001 Demo application for Windows (or develop your own application using the SDK that's available for the OPN2001).

Note: When planning to use the OPN2005 solely as a standard OPN2001, without Bluetooth or the need to run other applications, please note the following (hardware) differences:

- The OPN2005/6 does not support laser aiming (laser dot) currently
- The OPN2005/6 cannot change its scan angle to shorten the laser line currently

- Not all supported 2D symbologies of the PX20 can be configured using the OPN2001 Demo application. Use the Universal menu book instead.

Software V3793x: Batch demo application

This software turns the OPN200x / PX20 into a batch scanner that can transmit its saved data as a file. Use this application in combination with the OseComm or NetO32 Windows application.

This embedded application also makes it possible to use the OPN200x / PX20 as USB Mass Storage device, which stores all bar codes in a file that can be retrieved with any file explorer on any platform supporting USB Mass Storage.

The output format of the barcode file (comma separated) can be configured using the setup chart that can be found in the included user guide.

Trouble shooting

Since the OPN200x and PX20 don't have displays, they also don't have a system menu to resort to when a crashing application or OS prevents you from loading new software on the OPN200x / PX20.

For this reason the OPN200x and PX20 have a few escape mechanisms to allow you to restart, halt your application, and/or install new software. This can be very useful in case the OPN200x or PX20 has crashed or is constantly restarting due to a crashing application.

Restart mechanisms

Automatic	The OPN200x and PX20 have watchdog timers to determine whether the OS is still running or has crashed. The watchdog timer will cause the device to restart after 3 seconds if the OS has crashed. This watchdog timer will not cause a restart when only the application has crashed.
Manually	The OPN200x and PX20 have a manual restart mechanism that allows you to restart in situations that the OS is still running, but your the application has crashed. In order to activate this mechanism, press and hold both the trigger and delete key for at least 20 seconds. After the OPN200x/PX20 has sounded a short beep, you can release both keys to complete the restart.

Halting your application

- Restart your application using one of the two restart methods listed above, but keep both keys pressed after the short beep.
- Release the trigger key first to halt the application.

If successful, the LED of your OPN200x/PX20 should now be blinking orange. You should now be able to load new application or OS software.

To exit the halted application state, press both keys for 20 seconds

Halting the Operating System (only necessary in case a corrupt OS is installed)

- Restart your application using one of the 2 methods listed above, but keep both keys pressed after the short beep.
- Release the clear key first to halt the Operating system.

If successful, the LED of your OPN200x/PX20 should now be blinking red. You should now be able to load a new OS.

To exit the halted Operating System state, press both keys for 3 seconds

Version history *

RFL37910 (with OS version RBLV0012)	First release for OPN200	March 21, 2013
RFL37911 (with OS version RBxV0016)	Added support for PX20	April 16, 2013
RFL37912	Merged Advanced Bluetooth Demo features into this application Fixed iOS toggle Fixed reconnect failure Let OS handle scanning mode and opening/closing of COM ports	May 28, 2013
RFL37913	Changed LED indicators during connecting/disconnecting to make it more clear when the OS was busy.	June 12, 2013
RFL37914	Address an issue where the scan laser would not come on when connecting to certain iOS devices Add support for a low battery indicator and the JBATT command, to check the current battery percentage level	July 5, 2013
RFL37915 (OS: RBxV0019)	Added battery status options	July 19, 2013
RFL37916 (OS: RBxV0021)	Changes factory default to Bluetooth-HID	August 5, 2013
RFL37917	Added support for OS control of Bluetooth PIN type (fixed and manual/variable)	August 7, 2013
RFL37918 / RFM37918 (OS: RBxV0025)	Fixed Bluetooth reconnect issues Fixed USB-VCP issues Improved scan behavior of PX20 Lowered power consumption of OPN2005 Fixed USB-MSD issues (use batch demo)	January 24, 2014
RFL37919 / RFM37919 (OS: RBxV0026)	Fixed Bluetooth-VCP master connect issue	February 7, 2014
RFL3791A / RFM3791A (OS: RBxV0030)	Updated manual for OPN2006 Improved battery life Improved USB/Bluetooth transmission speed Added UTF-8 support in 2D barcoders	Sept 15, 2014
RFL3791C / RFM3791C / RFN3791C (OS: RBxV0035)	Added Bluetooth Low Energy (BLE) support (OPN2006 and PX20 only) Separate release for OPN2006 (RFN3791x) due to BLE support of OPN2006 Added inter-character-delay menu-option support Added 1-character menu-option support Added buzzer menu-options support Explicitly disabled USB-MSD default (C04) Added Battery status reports (for BLE only) Added length menu-options for PX20 Extended Bluetooth compatibility with more devices Added Bluetooth LV00 to LV07 power level menu-options (OPN2006 and PX20 only)	January 28, 2016

* Bug fixes and added features in the Operating Systems of the OPN2005/6 and PX20 are not always listed in the application version history above.

Please check our web site at www.opticon.com to see if there are updates available for the Operating System, this application and this manual.