OPN-2500

User manual rev 1.3

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Revision History

Product Name   : User manual OPN-2500

Revision	Date	Page	Section	Description of Changes
1.0	21/05/2024	-	-	First official release
1.1	25/06/2024	-	-	Fixed unpair barcode; updated trouble shooting section
1.2	20/08/2024	-	-	Added memorizing options Changed USB-MSD read/write default behaviour
1.3	25/10/2024	-	-	Added Software Development Kits (SDK)
		-	-	

Table of Content

1   Introduction

Welcome to the user manual for the OPN-2500 barcode companion scanner. This manual is designed to provide you with comprehensive guidance on how to effectively utilize the features and functionalities of the OPN-2500 to enhance your barcode scanning experience.

The OPN-2500 is a compact and versatile barcode scanner equipped with advanced technology, including Bluetooth Low Energy (BLE) connectivity and a high-speed 1D laser scan engine. Its ergonomic design, combined with its compatibility with various devices such as smartphones, tablets, and computers, makes it an ideal tool for a wide range of applications, from retail and inventory management to logistics.

In this manual, you will find detailed instructions on how to set up your OPN-2500, connect it to different devices, and perform barcode scanning tasks efficiently. We will cover everything from basic operations to advanced features, ensuring that you can maximize the capabilities of your scanner.

Whether you are a first-time user looking to get started with barcode scanning or an experienced professional seeking to optimize your workflow, this manual is your comprehensive guide to unlocking the full potential of the OPN-2500.

We encourage you to read this manual carefully and refer to it whenever you have questions or need assistance. If you encounter any difficulties or require further support, our dedicated customer service team is always here to help.

Thank you for choosing the OPN-2500 barcode companion scanner. Let us embark on a journey of seamless and efficient barcode scanning together!

2 Overview

The OPN-2500 barcode companion scanner is an innovative device designed to streamline barcode scanning tasks with ease and efficiency. In this chapter, we will provide you with an overview of the OPN-2500, highlighting its key features and capabilities.

2.1 Key Features

The OPN-2500 is packed with advanced features that makes it an indispensable tool for a variety of applications. Some of its key features include:

- **Compact and Portable:** With its compact size and lightweight design, the OPN-2500 is highly portable and can easily fit into your pocket or bag, allowing you to take it wherever you go.

- **High-Performance Scan Engine:** Equipped with a high-speed 1D scan engine, the OPN-2500 delivers fast and accurate scanning. Its 1D laser scan engine can capture barcodes at a speed of up to 100 scans per second, ensuring stress-free scanning in any environment.

- **Bluetooth Low Energy (BLE) Connectivity:** The OPN-2500 features modern Bluetooth 5.4 compliance, supporting Bluetooth Low Energy (BLE) with multiple services such as HID (Human Interface Device), DFU (Device firmware update), UART (Serial port emulation), and OptiConnect (Mobile application).

- **USB-C Connectivity:** A wide range of USB modes are supported, being USB COM-port (USB-VCP, USB-CDC; OptiConnect, OPN Companion mode, Firmware updates), USB-HID (Keyboard) and USB-MSD (Mass Storage Device)

- **Durable and User-Friendly Design:** Crafted with durability and user-friendliness in mind, the OPN-2500 is built to withstand the rigors of daily use while providing a seamless scanning experience. Its proven design and intuitive interface make it one of the most user-friendly scanners in the industry.

2.2 Applications

The versatility of the OPN-2500 makes it suitable for a wide range of applications, including:

- Bluetooth BLE HID mode (Keyboard)
- Bluetooth BLE mode (for OptiConnect)
- OptiConnect for iOS, Mac OS, Android and Windows
  - o Easy configuration
  - o Collect bar code data
  - o Easy export of bar code data
  - o Easy integration with custom apps (Intents; API)
  - o Wireless Device firmware update (DFU)
  - o Barcode validation
  - o Bluetooth BLE (all platforms) and USB (Windows and Mac OS)
- USB-MSD data collector (Mass Storage device)
- USB-Serial data collector (OseComm32 protocol)
- USB-VCP serial bar code reader (with and without memorizing)
- USB-CDC serial bar code reader (with and without memorizing) (platform independent)
- USB-HID bar code reader (keyboard mode; with and without memorizing)
- OPN Companion App and SDK (PC) compatible (OPN-2001 mode)
- Bluetooth Device Firmware update (DFU) using OptiConnect
- Appload support (device firmware update by USB)
- Full support of OptiConfigure (https://opticonfigure.opticon.com)

- **Retail:** Streamline checkout processes and inventory management tasks in retail environments.
- **Logistics:** Track and manage shipments, inventory, and warehouse operations with ease.
- **Ticket control:** Use the barcode validation features of OptiConnect for ticket control.
- **Field Service:** Enhance productivity and efficiency in field service operations, such as equipment maintenance and repair.

2.2.1 Custom applications (SDK)

Opticon provides several SDKs to customize the OPN-2500 firmware or write your own desktop/mobile applications to communicate with your device.

- The firmware on the OPN-2500 and OPN-6000 can be customized using the C-language Development Kit. More information can be found at *D.1 C-Language Development Kit & example applications*

- Create your own platform independent mobile application with all OptiConnect features using the OptiConnect SDK for flutter, which can be found at *D.2 OptiConnect SDK (Flutter)*

- Create desktop applications based on the OPN Companion application protocol using the Companion Application SDK, which can be found at *D.3 Companion Application SDK (OPN-2001 mode)*

3   Getting Started

This chapter will guide you through the initial setup process and help you get your scanner up and running quickly.

3.1   Unboxing Your OPN-2500

When you open the package containing your OPN-2500 barcode scanner, you will find the following items included:

- OPN-2500 barcode companion scanner
- USB-C charging cable
- Wristband
- Quick Start Guide
- Warranty Information

Ensure that all items are present and in good condition before proceeding with the setup.

3.2   Charging Your OPN-2500

Before using your OPN-2500 for the first time, it is important to note that the scanner will arrive with a less than full battery out of the box. While it is not mandatory to fully charge the battery before initial use, ensuring that the battery is adequately charged is still recommended for optimal performance.

Follow these steps to charge your device with USB:

1. Connect the USB-C charging cable to the OPN-2500.
2. Plug the other end of the charging cable into a power source, such as a USB port on your computer or a USB power adapter.
3. Allow the OPN-2500 to charge until the LED indicator shows green which means the OPN-2500 is fully charged. This typically takes around 2 to 3 hours.

3.3   Powering On Your OPN-2500

To power on your OPN-2500 barcode scanner, simply press and hold the scan button. The scanner will turn on and show the laser line, indicating that the scanner is ready to read barcodes.

3.4   Connecting to Devices

The OPN-2500 offers multiple connectivity options, including Bluetooth and USB. Follow these steps to connect your scanner to your preferred device:

- **Bluetooth Connection:** Enable Bluetooth on your device by holding the function key for 3 seconds and search for available devices (the device will blink blue). Select the OPN-2500 from the list of available devices and follow the on-screen instructions to complete the pairing process.

- **USB Connection:** Connect the OPN-2500 to your device using the provided USB-C cable. Your device should automatically recognize the scanner as a USB Serial Port (COM-port), USB HID (Human Interface Device) keyboard or USB MSD (Mass Storage Device), depending on the mode selected.

4   Scan Procedure

The OPN-2500 barcode scanner offers efficient and straightforward scanning capabilities for a wide range of applications. This chapter provides detailed instructions on how to perform scans using your OPN-2500 barcode scanner.

4.1   Basic Scanning Procedure

Performing a basic scan with your OPN-2500 barcode scanner is quick and easy. Follow these steps to capture barcode data:

1. Position the scanner over the barcode you wish to scan. Ensure that the barcode fully within the scanner laser line.
2. Press the scan button on the scanner to initiate the scanning process.
3. Once the barcode is successfully scanned, you will typically hear a confirmation beep and see a visual indication, such as a LED light, indicating that the scan was successful *
4. Depending on the operating mode (OptiConnect, OPN-2001 and data collector mode) the small function key can be used to codes.
5. Repeat the scanning process as needed for additional barcodes.

* If the OPN-2500 is currently not connected by Bluetooth or USB or is in data collector mode, the good-read indication is generally shorter, to indicate the barcode is stored in memory instead of being transmitted.

4.2   Configure Scanner Settings

The OPN-2500 barcode scanner offers various settings to meet your specific requirements. To configure these settings, you can either:
- Go to www.opticonfigure.opticon.com and follow the instructions there.
- Use the OptiConnect application (See chapter *5.2 OptiConnect app*)
- Use the OPN Companion application (See chapter *6.3 OPN Companion mode (OPN-2001 compatible)*)

5 How to connect to Bluetooth

The OPN-2500 barcode scanner offers versatile Bluetooth connectivity options to suit various operating environments and requirements. This chapter provides instructions on how to connect your OPN-2500 scanner to Bluetooth using multiple interfaces.
Default from the box a new scanner is configured to be used directly as a Bluetooth HID barcode scanner.

5.1 Bluetooth HID Connectivity

The OPN-2500 supports Bluetooth Low Energy (BLE) technology, enabling seamless wireless communication with compatible devices such as smartphones, tablets, and computers. Follow these steps to establish a Bluetooth HID connection:

1. Make sure the OPN-2500 is set to Bluetooth HID mode by scanning the label below.
2. Ensure that Bluetooth is enabled on the device you wish to connect to, such as a smartphone or tablet.
3. Press and hold the Function key on the OPN-2500 scanner for 3 seconds. The LED starts blinking blue indicating that the scanner is in pairing mode.
4. On your device, navigate to the Bluetooth settings menu and search for available devices.
5. Select the OPN-2500 scanner from the list of available devices to initiate the pairing process.
6. Follow any on-screen prompts to complete the pairing process. Once paired successfully, the Bluetooth indicator LED on the scanner will stop blinking, indicating a successful connection.
7. Your OPN-2500 scanner is now connected via Bluetooth, and you can begin scanning barcodes wirelessly.

Scan the label below to set your scanner to Bluetooth HID mode:
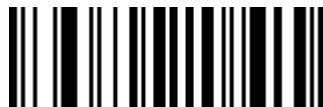
Bluetooth HID (C02)

5.2 OptiConnect application

OptiConnect is an application developed by Opticon to configure and manage the OPN series of barcode scanners.
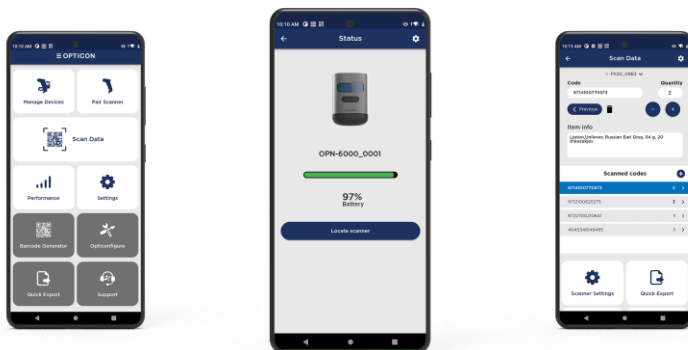
To connect your OPN-2500 scanner to the OptiConnect app:

1. Download and install the OptiConnect app from your app store or go to opticonnect.opticon.com (available for iOS, Android, Mac OS and Windows).
2. Make sure the OPN-2500 is set to BLE mode by scanning the label below.
3. Ensure that Bluetooth is enabled on your mobile device.
4. Launch the OptiConnect app and follow the on-screen instructions to pair your OPN-2500 scanner with the app.
5. Navigate to Settings and adjust the scan settings according to your preferences, such as scan mode, indicator options, and symbology support.

Bluetooth Low Energy (EBLE)   ‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖

5.2.1 Using OptiConnect with USB

Since OPN-2500 OS version FBMV0114, it also possible to use OptiConnect on Windows and MacOS in combination using the USB-C cable instead of Bluetooth BLE.

1. Download and install the OptiConnect app from your app store or go to opticonnect.opticon.com (available for iOS, Android, Mac OS and Windows).
2. Make sure the OPN-2500 is set to USB-CDC (OptiConnect) mode by scanning the label below.
3. Launch the OptiConnect app and the OPN-2500 scanner should connect automatically.
4. Navigate to Settings and adjust the scan settings according to your preferences, such as scan mode, indicator options, and symbology support.

USB-CDC (OptiConnect)   ‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖

6 How to connect to USB

The OPN-2500 scanner can also connect directly to computers and other devices via USB for wired data transmission and charging.

The following USB operating modes are available, which will be described in the following chapters:

- USB Serial (COM) barcode scanner
- USB HID (keyboard) barcode scanner
- OPN Companion mode (previously called OPN-2001 simulation)
- OseComm data collector (previously called Batch application)
- USB Mass Storage Device (MSD)

6.1   USB Serial (COM) barcode scanner

The OPN-2500 can be used like a standard USB serial barcode scanner by reading the label below:

USB-VCP (C01)

Follow these steps to connect your OPN-2500 scanner via USB in Serial mode:

1. Insert the USB-C charging cable into the USB-C port located on the scanner.
2. Plug the other end of the USB-C cable into an available USB port on your computer.
3. The USB driver should install automatically. If not, it can be downloaded from our download page (https://opticon.com/downloads/)
4. Once the driver has been installed, a COM-port will be created that can be opened using any serial port monitor (for example Appload from Opticon).
5. As soon as the COM port is opened, the scanner will sound a high connect beep.
6. Scanned barcodes will now automatically be transmitted. While the OPN-2500 is not connected, barcodes will be stored in memory and transmitted as soon as the connection is restored.

6.2   USB Keyboard (HID) barcode scanner

The OPN-2500 can be used like a standard USB HID barcode scanner by reading the label below:

USB-HID (SU)

Follow these steps to connect your OPN-2500 scanner in USB HID mode:

1. Insert the USB-C charging cable into the USB-C port located on the scanner.
2. Plug the other end of the USB-C cable into an available USB port on your computer.
3. The standard USB keyboard driver will install automatically.
4. Once the driver has been installed, the scanner will sound a high connect beep to indicate it is ready to scan and transmit barcodes as keyboard input.
5. Scanned barcodes will now automatically be transmitted. While the OPN-2500 is not connected, barcodes will be stored in memory and transmitted as soon as the USB connection is restored.

6.3   OPN Companion mode (OPN-2001 compatible)

On previous scanner models this mode was called the "OPN-2001 simulation application". The scanner will behave as if it is an OPN-2001 and allows you to download your scanned data using the OPN Companion application.
When a new scanner is taken from the box and is connected to the OPN Companion application the scanner will automatically switch to the OPN-2001 mode. To manually switch to OPN-2001 mode, you can also use the label below:

OPN-2001 mode (U2)

The USB driver should install automatically. If not, it can be downloaded from our download page (https://opticon.com/downloads/)

The OPN Companion application can also be found on the download page (under OPN-2500 > Companion App)

When the scanner is detected by the OPN Companion application it should automatically open the scanners Virtual Comport.
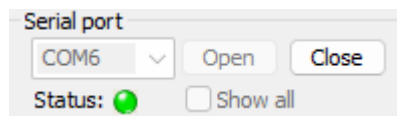
You can download the data from your scanner to the PC by pressing the "Get Barcodes" button in the application. When "Save to file" is enabled the data is automatically stored in the selected file (default "Barcodes.txt") on the selected location.

What data and how this data is stored in the output file can be configured using the available options at the bottom of the application.
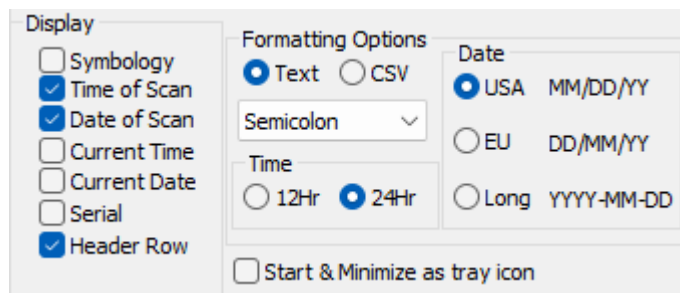
*Note that the use of the "quantity field" is not supported in OPN-2001 mode".

6.4 Batch modes (USB-MSD / OseComm)

The batch modes allow the OPN-2500 to save scanned barcode data into a file on the device, and for the devices to deliver the scanned barcode data file to a local PC.
The data files can be retrieved from the scanner either by using USB-MSD (Mass Storage Device) or by using the OseComm file transfer protocols over USB-VCP (Virtual COM Port; serial port emulation).
The scan behavior and output format of the resulting database file can be customized as desired.

This chapter describes all the batch mode features as well as handling instructions.

6.4.1 Deleting the barcode data

It is possible that your companion scanner is full, or you've already copied the barcode data from the device. In these situations, it is possible to read the label below to erase all files from the flash disk.

+ - F O R M A T - +

6.4.2 USB Mass Storage Device (MSD)

To set the scanner into USB-MSD mode please scan this configuration label:
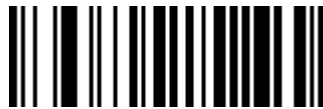
MSD mode (C04)

When the scanner is connected to a Laptop/PC/MAC in MSD mode a file called 'SCANNED.TXT' is automatically generated using the data from the database file. The default format of each record in the output file is:

<Barcode>,<serial #>,<hh:mm:ss>,<dd/mm/yyyy>

To customize the output format of the database file, please refer to *Appendix B: Database output formatting.*

6.4.3 Read-only vs Read/write

When the MSD mode has been selected, the companion scanner will behave like a read-only USB mass storage device when connected to USB.

The file system has been made read-only (write protected) due to issues with Windows 8.1 and later, causing the file system to become corrupt when the device was disconnected without performing a safe removal. This is due to the incorrect creation of a 'system volume information' folder on the FAT file system by Windows.

When using Windows 8.1 and later. To prevent data-loss, make sure you enable the Windows option: '**Do not allow locations on removable drives to be added to libraries**' before considering re-enabling full access using the options below:

Use the labels below to change this behavior.

USB MSD Read only (Default) (BQR)

USB MSD Read/Write; (BQW)

Any scanned barcodes will be stored in a comma separated value file called: SCANNED.TXT. This file can be copied from the companion scanner using a file browser.

Due to the limited amount of flash memory inside the companion scanners the size of the file system is small, being about 2MB. This is enough space for storing barcodes, but not for using the companion scanners as a portable hard drive.

Important notes:
• Since the file system is read-only by default, use the +-FORMAT-+ label on chapter *6.4.1 Deleting the barcode data* to erase the data after all barcodes have been copied from the disk.
• When manually deleting the file: 'SCANNED.TXT', also delete the local files 'SCANNED.DAT and 'SCANNED.IDX' from the disk as well, because those are the files the companion scanner uses, while 'SCANNED.TXT' is merely an export of these 2 files.
• Editing 'SCANNED.TXT' will have no effect and will be reverted to its previous state as soon as the USB cable is subsequently connected again.

6.4.4   Data Collector mode (OseComm)

Like USB-MSD mode, the scanner can be configured as OseComm compatible data collector and output the barcode data as file by its USB serial port.

Scan the configuration label below to enter Data collector mode:

Data collector Mode (OPND)

When the scanner is connected to a PC in data collector mode (OseComm) a file called 'SCANNED.TXT' is automatically generated using the data from the database file.

This file can be retrieved using the OseComm32 application.

6.4.4.1   OseComm32

The latest version of OseComm32 can be downloaded from our website under 'Service and Support' > Downloads > 'Handheld Scanners'. OseComm is listed on each product that can use it.

Connect your OPN to the PC and select the correct COM-port of your device in the "Communication options Window" of OseComm32 (under Options > Communication settings).

Select 'Run protocol at start' if you wish to execute the protocol tasks at startup.
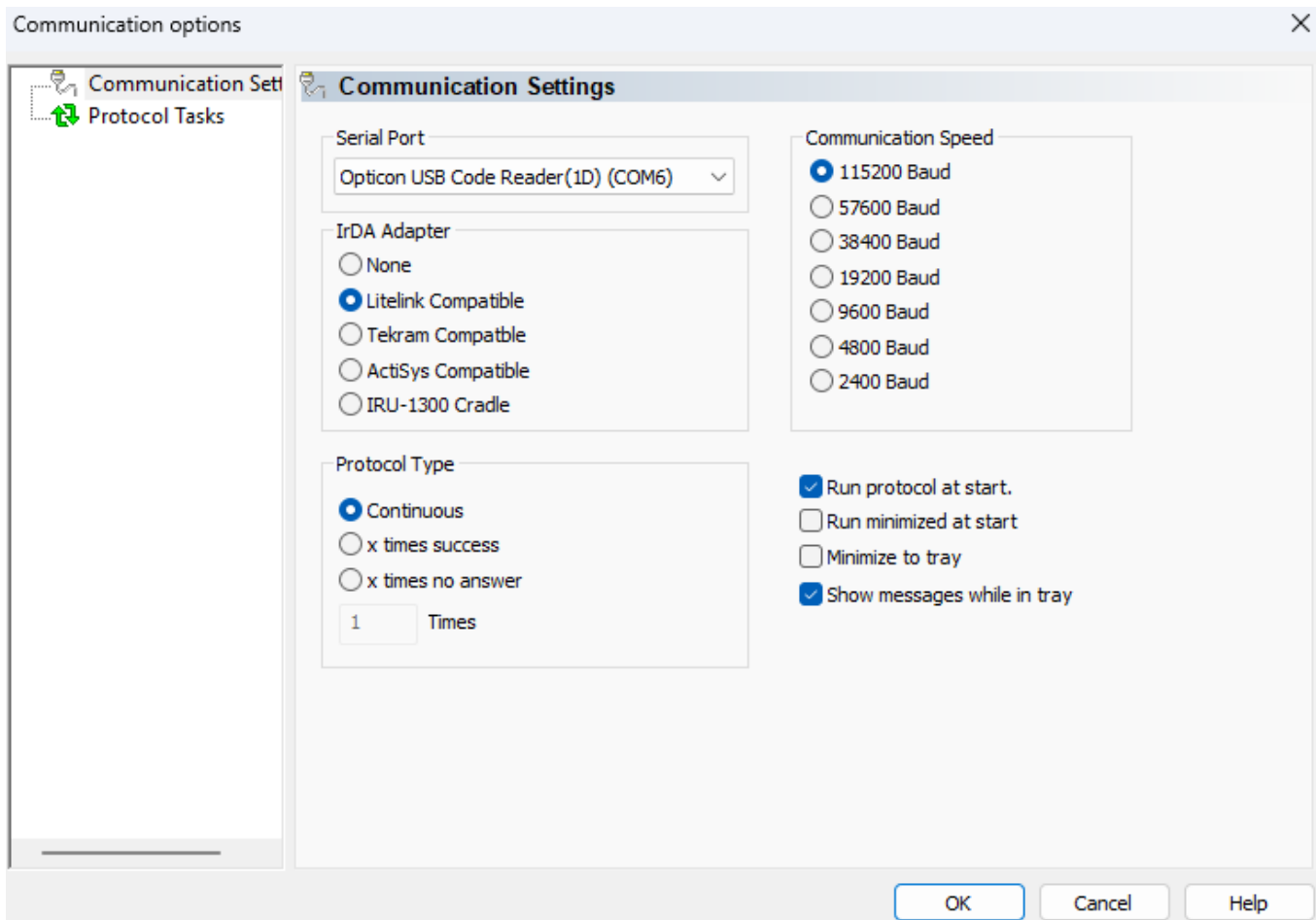
Next, go to 'Protocol Tasks', select 'Receive File(s)' under 'Task Group' and press 'Add task'.
In the Receive Files(s) Dialog the task can be configured as shown in the following image.
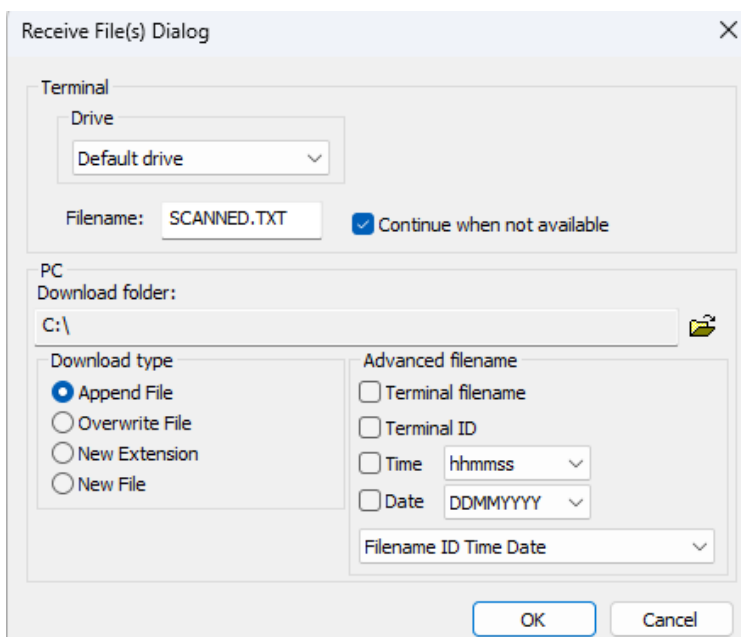
Make sure the OseComm application has permission to write files on the selected locations folder.

Finally, select 'Options' > 'Start Protocol'.

The file will now automatically be downloaded to the PC and deleted from the scanner when the scanner is connected to the correct comport.

Note that a different USB port will give the scanner a different comport number. Make sure you use the same USB port when connecting the scanner to your PC.

More information about additional OseComm32 features can be found in the help file of OseComm32.

6.4.5 Barcode database files

All scanned barcodes are stored in a database file. The filename of the database is 'SCANNED.DAT', which is stored on the companion scanner with an index file called 'SCANNED.IDX'. These files are for internal use only.

The file 'SCANNED.TXT' is the automatically generated output-file that generated, each time the device is connected to USB.

The format of the output file can be customized as desired.

7   Memorizing and data transmission

7.1   Memorizing

When your device is not connected to Bluetooth (or to USB) the OPN-2500 will automatically store any barcodes in memory until the connection is restored. This process is called memorizing.

To enable/disable this feature, use the barcodes below:

Data memorizing: Disabled (DTMD)

Data memorizing: Enabled (DTME; default)

7.1.1   Memorizing options

Under what circumstances, scanned barcodes should be memorized can be configure using the following options:

Memorize: After connection loss (BMO)

Memorize: When not connected (BM1; default)

Memorize: Always (BM2; batch mode)

7.1.2 Manual memorizing and transmission options

Independent of the configured memorizing options, memorizing can be enabled/disabled manually as well using the following barcodes

+-MSTR-+	Start/continue memorizing	
+-MSTP-+	Stop/pause memorizing	
+-MXMT-+	Transmit memorized data (and erase)	
+-MXTO-+	Transmit memorized data, no erase	
+-MCLR-+	Clear all memorized data	

7.2 Transmission of memorized data

Depending on the selected interface or mode, the OPN-2500 will transmit its memorized data shortly after (re)establishing the connection (OptiConnect & serial modes) or after pressing the trigger key (Keyboard/HID modes).

This can be changed by using the following options:

Transmit after (re)connection (BQB)

Press trigger to transmit (BPL)

Advanced send mode (BPK)

The following chapters will describe this option in more detail.

7.2.1 Transmit after (re)connection

When this option is enabled, memorized data will automatically be transmitted 3 seconds after the connection is (re)established.

7.2.2 Trigger to transmit (HID modes)

When using the device in HID mode, it's not desired to immediately transmit the memorized data upon reconnection, because it would not allow the user to select the application or field (i.e. notepad) where the data should be entered as keyboard data. Therefore, the default when using HID mode is 'Trigger to transmit'.
After pressing the trigger, the data will be transmitted. When successful, the data is deleted afterwards.

7.2.3 Advanced send mode

To have more control over **when** the barcode data is transmitted, the 'Advanced send mode' option has been added.

When enabled and the device is connected to USB or Bluetooth:
- Press (and hold) scan button for 3 second to transmit all stored data. *
- Press (and hold) function button for 3 seconds to delete stored data.

* Memorized data can be transmitted multiple times, if needed
** Even when data is in memory, new barcodes can be scanned and transmitted immediately.

A memory indicator (blinking LED) is shown during the 3 second period that the scan key (green) or function key (orange) is pressed, to indicate that there is still data present in memory.

8 Trouble shooting

Since the companion scanners do not have a display, they also don't have a system menu to resort to when a crash prevents you from loading new software on your companion scanner.

For this reason, the companion scanners have a few escape mechanisms to allow you to restart or enter firmware update mode. This can be particularly useful in case the companion scanner has crashed.

8.1 Restart mechanisms

8.1.1 Automatic
The companion scanners have a watchdog timer to determine whether the OS is still running or has crashed. This watchdog will cause the device to restart after about 2 seconds if the OS has crashed.

8.1.2 Manually
The companion scanners have a manual restart mechanism that allows you to restart in situations where the scanner is not responding. To activate this mechanism, press and hold both the trigger and function key for at least 15 seconds. After the companion scanner LED turns white, you can release both keys to complete the restart.

8.1.3 Manually enter firmware update mode
- Restart your application using the method listed above, but keep both keys pressed after the LED turns white.
- Release the function first to enter firmware update mode.

If successful, the LED of your companion scanner should now be blinking red. You should now be able to load new firmware using Appload or OptiConnect.

To exit firmware update mode, press both keys for 3 seconds (or wait 30 seconds).

8.2 USB Connection issues

When experiencing USB connection or communication issues, this could have several reasons:

1. First make sure you've scanned the correct default barcode with the OPN-2500 (see chapter 6 How to connect to USB)
2. Make sure the desired host application (Appload, OPN Companion app, OseComm32 or OptiConnect) is running
3. Check the USB-C cable and connector for damage or dust
4. Run the latest Opticon USB driver installer, which can be found in the downloads section of our website
5. Select the alternative USB driver (USB-CDC) as described in the following section

If there are some issues using the Opticon driver it is possible to use the alternative USB-CDC driver (also used by most Opticon 2D barcode readers). This can be helpful for Linux and MAC compatibility. Also, if you have a driver issue but need to update the firmware, it is possible to use this CDC driver.

USB CDC mode (BPC)

This mode functions the same as USB-VCP mode but uses the Opticon 2D barcode driver which is useful for Linux and MAC compatibility.

OPN-2001 mode (USB-CDC) (BQZ)

Switch to OPN-2001 compatibility mode but use the USB-CDC driver instead of the standard driver. Use the latest OPN Companion application to configure the OPN-2500 and retrieve the bar code data.

8.3   Bluetooth connection issues

If the OPN-2500 fails to connect to your Bluetooth device this could have several reasons and solutions.

1. Make sure your host device supports Bluetooth Low Energy (BLE) and has Bluetooth enabled
2. Make sure you've scanned the correct default barcode (HID or OptiConnect) with the OPN-2500 (see chapter 5 How to connect to Bluetooth)
3. Make sure your OPN-2500 is connectable (flashing Blue) by pressing the function key for 3 seconds
4. When using OptiConnect, make sure the application is running on your device
5. If you've previously connected in Keyboard/HID mode and switched defaults (i.e. OptiConnect mode), delete the existing pair on the host device.
6. If reconnecting keeps failing, it's most likely that either the OPN-2500 or the host device has lost its pairing / bonding information.

Usually this is resolved by deleting the paired OPN-2500 from your host device in the Bluetooth settings menu. After that, re-establish the connection as described in chapter 5)

It is also possible to delete all pair information on OPN-2500 by reading the label (+-UNPR-+) below:
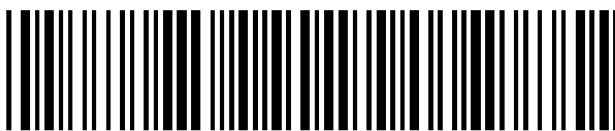
+-UNPR-+ (delete all pairs)

7. In keyboard/HID mode, if keys stay pressed during transmission of a barcode, try to avoid moving out of range, manually enable memorizing or select a different default that is more suitable for moving in and out of range (i.e. OptiConnect or one of the batch modes)
8. Make sure that there is no other host device still connected or paired to your OPN-2500
9. If you're experiencing issues with other mobile devices connecting to your device with OptiConnect, consider enabling 'connection pooling' in OptiConnect to ensure only your mobile device can connect to your OPN-2500.

10. Try reading your BLE default barcode (HID or OptiConnect) to reset your settings:

Bluetooth HID (C02)
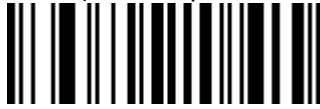
Bluetooth Low Energy (EBLE)

11. Try updating the firmware of your OPN-2500 using Appload or OptiConnect if connection issues persist.
12. If firmware updating fails using OptiConnect. Press both buttons 5 seconds and read the default barcode.
13. If firmware updating keeps failing using OptiConnect, try using Appload instead
14. If connection issues persist, try contacting Opticon Support

Appendix A: Batch mode scan behaviour

The scan behaviour in batch mode can be customized by specifying the behaviour of the function key and specifying the behaviour on scanning of duplicate barcodes.

A.1 Good read / LED behavior

If a barcode is read using the trigger key and is successfully read, a good-read beep is sounded, and a green good-read LED is shown.

To remove a barcode from the database (or decrease the quantity), they should be read using the function key. A short good-read beep is sounded, and an orange good-read LED is shown. See chapter *A.2 Function-key behavior*

If a barcode is scanned using the delete key that is not present in the database, or that already has a quantity of '0', a low error beep is sounded, and a red LED is shown.

A.2 Function-key behavior

Enable/disable delete key	By default, the function key can be used to remove a previously read barcode from the database or reduce its quantity by one. By disabling the delete key this option can be disabled.
Negative quantities allowed/not allowed	By default, you cannot delete barcodes that are not present in the database. However, for some purposes it can be useful to be able to read them anyway to specify a negative quantity. *
Erase data / Format	By default, the function key cannot be used to delete all data from the scanner. By enabling the 'Format On' option. All data can be permanently erased by pressing the function key for 10 seconds

* When a specific barcode has a negative quantity the LED color changes from green (add) or orange (subtract) to red on a good-read and the sound becomes slightly lower.

Use the labels below to configure this behaviour:

Delete Key			
Disabled		[+QB	
Enabled	Yes	[+QC	
Format Off	Yes	]+DNO	
Format On		]+DEL	

Use the labels below to configure the negative quantity behaviour:

Negative Quantities			
Option	Default	Encoded Data	Barcode
Allowed		[+QN	
Not Allowed	Yes	[+QP	

A.3 Use of summed quantities (quantity field)

By default, all barcodes are stored separately. However, in batch mode it is also possible to store how many times a barcode has been read.

To enable this feature, add the 'quantity field' to the database output sequence. See Appendix *B.1 Field Output Sequence.*

If the quantity field is added to the output sequence, the barcode is then stored in the database with a quantity of '1'. If the same barcode is scanned again using the trigger key the quantity is increased by one. If the same barcode is scanned using the function key, the quantity is decreased by one.

Appendix B: Database output formatting

In batch mode, the default output format of each record in the database file (SCANNED.TXT) is:

```
[Barcode],[serial #],[hh:mm:ss],[dd/mm/yyyy]
```

However, batch mode allows you to customize this format to make it suitable for your own application. The following aspects of the output format are configurable. Read the configuration barcodes on the following page to select the various options.

Date format	16 date formats are supported (see following page)
Time format	2 time formats are supported (hh:mm:ss and hh:mm)
Field separator	The field separator is the character that is used to separate the various fields of a database record. 7 different separators can be selected.
Barcode field size	By default, the barcode field size is variable length, but this can be changed between 1 and 99 characters by reading 2 configuration labels on the following page to specify both digits of the desired size.
Quantity field size	By default, the quantity field is variable length, but this can be changed from 1 to 9 digits if desired.
Delete record if quantity=0	By default, a record is deleted if a barcode in the database (with a quantity of 1) is read using the delete key. However, if you desire to keep a record of all delete actions it is possible to leave the record with a quantity of '0' in the database by disabling this option.
Field output sequence	Each record can contain up to 5 fields (barcode, date, time, quantity and serial number). The output sequence can be customized by reading up to 5 labels on the following page. By not specifying a quantity field each barcode will be stored separately in the database. The database also will not be sorted and in case a barcode is read using the delete key the last occurrence in the database will be deleted. It is not allowed to not specify a barcode field in the output sequence.

Date Format			
Option	Default	Encoded Data	Barcode
DD-MM-YYYY		[+D0	
MM-DD-YYYY		[+D1	
DD-MM-YY		[+D2	
MM-DD-YY		[+D3	
YYYY-MM-DD		[+D4	
YY-MM-DD		[+D5	
DD-MM		[+D6	
MM-DD		[+D7	
DD/MM/YYYY	Yes	[+D8	
MM/DD/YYYY		[+D9	
DD/MM/YY		[+DA	
MM/DD/YY		[+DB	
YYYY/MM/DD		[+DC	
YY/MM/DD		[+DD	
DD/MM		[+DE	
MM/DD		[+DF	

Time Format			
Option	Default	Encoded Data	Barcode
HH:MM:SS	Yes	[+T0	
HH:MM		[+T1	
Field Separator			
Comma	Yes	[+FC	
GS		[+FG	
Semicolon		[+FH	
LF		[+FL	
Pipe		[+FP	
CR		[+FR	
Slash		[+FS	
Tab		[+FT	
NUL		[+FZ	
Space		[+FA	

Negative Quantities			
Option	Default	Encoded Data	Barcode
Allowed		[+QN	
Not Allowed	Yes	[+QP	
Quantity Field Size			
Variable	Yes	[+Q0	
1		[+Q1	
2		[+Q2	
3		[+Q3	
4		[+Q4	
5		[+Q5	
6		[+Q6	
7		[+Q7	
8		[+Q8	
9		[+Q9	
Delete Record if Quantity == 0			
Disabled		[+QY	
Enabled	Yes	[+QZ	

Barcode Field Size (One's Place)			
Option	Default	Encoded Data	Barcode
0 / Variable	Yes	]+B00	
1		]+B01	
2		]+B02	
3		]+B03	
4		]+B04	
5		]+B05	
6		]+B06	
7		]+B07	
8		]+B08	
9		]+B09	
Barcode Field Size (Ten's Place)			
00 / Variable	Yes	]+B0-	
10		]+B10	
20		]+B20	
30		]+B30	
40		]+B40	
50		]+B50	
60		]+B60	
70		]+B70	
80		]+B80	
90		]+B90	

B.1 Field Output Sequence

To change the output sequence of the various fields in the output file, use the labels below.

Field Ouput Sequence (Field 1)			
Option	Default	Encoded Data	Barcode
Barcode	Yes	]+S0B	
Quantity		]+S0Q	
Serial #		]+S0S	
Time		]+S0T	
Date		]+S0D	
Field Output Sequence (Field 2)			
Barcode		]+S1B	
Quantity		]+S1Q	
Serial #	Yes	]+S1S	
Time		]+S1T	
Date		]+S1D	
<None>		]+S1N	
Field Output Sequence (Field 3)			
Barcode		]+S2B	
Quantity		]+S2Q	
Serial #		]+S2S	
Time	Yes	]+S2T	
Date		]+S2D	
<None>		]+S2N	

Field Ouput Sequence (Field 4)

Option	Default	Encoded Data	Barcode
Barcode		]+S3B	
Quantity		]+S3Q	
Serial #		]+S3S	
Time		]+S3T	
Date	Yes	]+S3D	
<None>		]+S3N	

Field Output Sequence (Field 5)

Option	Default	Encoded Data	Barcode
Barcode		]+S4B	
Quantity		]+S4Q	
Serial #		]+S4S	
Time		]+S4T	
Date		]+S4D	
<None>	Yes	]+S4N	

Appendix C: Maintenance and safety

Proper maintenance and adherence to safety precautions are essential for ensuring the optimal performance and longevity of your OPN-2500 barcode scanner. This chapter provides guidelines for maintaining your device and ensuring safe usage.

C.1 Maintenance Guidelines

Follow these maintenance guidelines to keep your OPN-2500 scanner in optimal condition:

1. **Cleaning:** Regularly clean the scanner's exterior using a soft, dry cloth. Avoid using abrasive cleaners or solvents, as they may damage the device's surface.
2. **Avoiding Liquids:** Keep the scanner away from liquids and moisture. Do not immerse the device in water or expose it to rain.
3. **Battery Care:** To maximize battery life, avoid overcharging or discharging the battery completely. Charge the scanner in a dry, well-ventilated area.
4. **Storage:** Store the scanner in a cool, dry place when not in use. Avoid storing it in extreme temperatures or environments with high humidity.
5. **Avoiding Physical Damage:** Handle the scanner with care to prevent drops, impacts, or other physical damage. Use protective cases or covers, if necessary, especially during transport or storage.
6. **Firmware Updates:** Regularly check for firmware updates and install them as recommended by Opticon to ensure optimal performance and compatibility with new features or enhancements.

C.2 Safety Precautions

Follow these safety precautions to prevent accidents and ensure safe usage of your OPN-2500 scanner:

1. **Avoiding Exposure to Extreme Conditions:** Do not expose the scanner to extreme temperatures, high humidity, direct sunlight, or corrosive substances. Operating the device in such conditions may cause malfunction or damage.
2. **Proper Handling:** Hold the scanner securely and avoid dropping or mishandling it. Use caution when connecting or disconnecting cables to prevent damage to connectors.
3. **Battery Safety:** If the battery shows signs of swelling, overheating, or leakage, discontinue use immediately and contact Opticon support for assistance. Do not attempt to disassemble or repair the battery yourself.
4. **Avoiding Eye Damage:** Do not stare directly into the LED light from the scanner's scan window, as it may cause eye damage. Use caution when operating the scanner in brightly lit environments.
5. **Child Safety:** Keep the scanner out of reach of children and pets to prevent accidental ingestion or injury. Do not allow children to handle the scanner without adult supervision.
6. **Compliance with Regulations:** Ensure compliance with local regulations and guidelines regarding the use and disposal of electronic devices, batteries, and other accessories associated with the scanner.
7. **Emergency Procedures:** In case of any malfunctions, overheating, or other emergencies, immediately disconnect the scanner from power sources and contact Opticon support for assistance.

By following these maintenance and safety guidelines, you can ensure the reliable operation and longevity of your OPN-2500 barcode scanner while minimizing the risk of accidents or damage.

Appendix D: Software Development Kits (SDK)

Opticon provides several software development kits and example applications that can be used to customize the functionality of the OPN-2500 and OPN-6000 for your own application or to build your own mobile or desktop application to communicate with your device.

D.1 C-Language Development Kit & example applications

This SDK describes how to write or customize your own C language applications for the OPN-2500 & OPN-6000 that can be loaded on these devices using Appload.

The SDK can be found and downloaded here:
https://github.com/OpticonOSEDevelopment/opn2500_opn6000_sdk

The complete documentation can be found online at:
https://opticonosedevelopment.github.io/opn2500_opn6000_sdk/

D.2 OptiConnect SDK (Flutter)

To unlock the functionality of OptiConnect in your own mobile application, Opticon has created a platform independent SDK in Flutter.

The SDK can be found and downloaded here:
https://github.com/OpticonOSEDevelopment/opticonnect_sdk_flutter

The complete documentation can be found online at:
https://opticonosedevelopment.github.io/opticonnect_sdk_flutter/

(Note: a native Android SDK is currently in beta phase)

D.3 Companion Application SDK (OPN-2001 mode)

Create your own desktop application, based on the protocol of the OPN-2001, using the Companion SDK.

The SDK and documentation can be download here:

https://www.opticon.com/support/OPN-2001%20PC%20Application/OPN-2001%20SDK.zip

Appendix E: Firmware Version history

Version	Changes	Date
FBNV0110 / FFN40767	First beta release	Mar 28, 2024
FBNV0114 / FFN40768	- Fixed various issues with BLE HID (mostly under Windows) - Improved connection stability and Bluetooth range - Give better feedback on connection failure (when host or OPN lost its pairing information) - Added software flow control / Barcode validation in OptiConnect - Changed factory default: EBLE (OptiConnect) -> C02 (BLE HID default) - Fixed issues with transmitting large barcode over USB-VCP and USB-CDC and BLE Serial (NUS) - Added OptiConnect support over USB-CDC (MacOS and Windows) - Corrected charging temperature range: to 0-45C - Fixed firmware update issues when using USB-CDC driver - Disable Bluetooth DFU if a firmware update is performed by Appload (USB) - Reduced blue flash frequency and intensity when connectable - Sped-up slow advertisement interval to 500ms (quicker connect) - Fixed issue with responding to the incorrect interface on serial commands - Fixed buzzer polarity issue, causing click sounds - Changed default intercharacter delay resolving notepad issues under windows	May 1, 2024
FBNV0115 / FFN40768	- Fixed issue with software flow control / barcode validation (failed after 20 barcodes)	May 3, 2024
FBNV0116 / FFN40768	- Fixed firmware update issue with OptiConnect	May 6, 2024
FBNV0117 / FFN40768	- Implemented 'connection pooling' in OptiConnect to easily connect to and switch between mobile devices using a barcode - Improved auto-reconnect on iOS devices with screen locked or on standby - Fixed issue with exporting barcodes in MSD mode that contained null characters or carriage returns - Added Brazilian keyboard support (menu option "BAZ") - Extended list of supported serial LED and sound commands	May 30, 2024

FBNV0118 / FFN40769	- Added support for RS3000 compatible sound response in OptiConnect
	- Fixed write access to device name characteristic, should be read-only
	- Added method to switch to OptiConnect default while in BLE HID mode
	- Fixed deformed sound on continuous read and fast reading of barcodes
	- OPN Companion mode:
	    - Fixed transmit issue with 'stored RTC' disabled
	    - Firmware update bug when 'memory not empty'-indicator enabled
	    - Fixed crash on reading invalid application settings
	    - Fixed sound and led indicator menu-options
	    - Fixed disabling of interleaved 2of5
	    - Rare issue with laser not turning on when charging
		Jun 18, 2024

FBNV0121 / FFN40769	- On startup with function key pressed, become discoverable after 4 seconds)
	- Don't become discoverable on startup of OPN2001 and batch application
	- Resolved increased power consumption (data collector and OPN2001 mode)
	- OPN Data Collector mode (OseComm & USB-MSD)
	    - Added green blinking indicator when connected to USB (OseComm only)
	    - Fixed Firmware update bug (OseComm only)
		Jun 20, 2024

FBNV0122 / FFN4076A	- Resolved connection and firmware update issues after switching between HID and OptiConnect - Resolved connection issues after reading unpair barcode - OPN Companion mode: Increased default max. Barcode length from 30 to 250	Jun 25, 2024
FBNV0123 / FFN4076A	- OptiConnect mode: Fixed unwanted pairing request after firmware update - Batch mode (MSD/OseComm): Fixed issue with 'Format after pressing delete key for 15 sec' option - USB-MSD: Changed behaviour: Show no files, instead of empty files when no barcode data is present	Jun 28, 2024
FBNV0124 / FFN4076B	- OPN Companion mode: - Resolved slow barcode data transfer speed	July 10, 2024

FBNV0125 /
FFN4076B
	- Bluetooth reliability and speed improvements on barcode data transmission
	- Added locate host feature: shows a blue to red LED depending on the distance to host device (pres both keys, keep function key pressed and press trigger 3 times in succession; press both keys again to abort)
	- Fixed pre-/suffix and Code-ID of POSTNET code
	- Fixed pre-/suffix and Code-ID of Intelligent Mail barcode
	- Added the following configuration options:
	  - Trigger to send: Enabled (BPL) (Send memorized data when trigger is pressed)
	  - Trigger to send: Advanced send mode (BPK)
	  - Trigger to send: Disabled (BQB) (Default; Send after 3 seconds)
	  - Transmit timestamp: Enable (BP2)
	  - Transmit timestamp: Disable (BP3) (Default)
	  - Transmit Code ID: Enable (BP4)
	  - Transmit Code ID: Disable (BP5) (Default)
	  - Transmit Serial: Enable (BQ2)
	  - Transmit Serial: Disable (BQ3) (Default)
	- Added OPN Companion mode only menu-options:
	  - Memory indication: Not empty (BQ4; Blink when not empty)
	  - Memory indication: Disabled (BQ5) (Default)
	  - Buzzer toggle: Enable (BPM; Disable buzzer after trigger press for 10s)
	  - Buzzer toggle: Disable (BPN) (Default)
	- Changed default behaviour: Disabled trigger to connect/disconnect in USB-HID/VCP/CDC mode
		July 26, 2024

FBNV0126 / FFN4076C	- (Temporarily) disabled memorizing in HID mode by default - Resolved pairing issues in BLE HID mode	Aug 4, 2024
FBNV0127 / FFN4076C	- Added Memorzing transmit data option: Advanced send mode (BPK) - Re-enabled memorizing and enabled 'Trigger to transmit' in USB-HID / BLE-HID mode by default - Changed USB-MSD file system setting to read/write by default (see chapter *Error! Reference source not found.*)	Aug 20, 2024

FBNV0128 /
FFN4076D
	- First release of the C-language Software Development kit (incl. example applications)
	- First release of OptiConnect SDK for mobile apps (Flutter)
	- Companion application:
	      - Fixed bug on setting volume to very LOW
	      - Added Aiming support on OPN-2500 using a dotted line
	      - Fixed battery and charging indication issues
	      - Fixed Implementation of EAN-128 enable/disable
	      - Sped-up communication on slower commands to prevent time-outs on custom application
	- Resolved BLE HID reconnection issues with trigger key and after reading +-UNPR-+
	- Trigger-to-send: Prevent instant transmission upon pressing the trigger to reconnect
	- Enabled aiming help on OPN-2500 in menu-book mode
	- OptiConnect: Resolved issue with ack/nak protocol (No response resulted in 'connection lost' state)
	- Added filtering of duplicate menu options in memory (to prevent memory overflows)
	- Fixed some issues when switching between various USB and BLE defaults
	- Improved (optional) startup buzzer (only sound on cold-boot)
	- Fixed issue where data was memorized after connection loss, even with memorizing disabled
	- Changes related to supporting various SerialIO applications (requires SerialIO firmware on OPN)
	- Resolved USB-HID driver issues, including capslock & numlock modes
		Oct 25, 2024