OPI 4002

Wireless 1D/2D Scanner

OPTICON

Instruction Manual

All information subject to change without notice.

Document History

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1. Overview

This instruction manual provides safety and operating instructions for the OPI 4002. This wireless scanner complies with IEEE 802.15.4 (a wireless specification issued by the Institute of Electrical and Electronic Engineers). Please read these instructions carefully before operating this device.

This manual applies only to the wireless interface. Specifications and additional detailed settings are available in the OPI 4002 Master Specifications and the Universal Menu Book.

2. Safety, Regulations, and Handling

This instruction manual includes the following symbols and markings to help you use this product properly and safely.

WARNING
For your own safety, read these procedures carefully before using this product. After reading this document, keep it accessible for future reference.

2.1. Symbols

For safe use of this product, note that in this document, warnings and cautions are indicated by symbols. The meanings of those symbols are described below. Be sure to remember their meanings.

WARNING If you ignore the warning described and operate the product in an improper manner, there is a danger of serious bodily injury or damage to the product and/or the environment.

CAUTION If you ignore the caution described and operate the product in an improper manner, there is the potential for damage to the product.

To indicate the type of danger and damage, the following symbols are also used with warnings and cautions. Notes are also used to indicate special information.

This symbol indicates a DO. It will be accompanied by instructions on something you must do in that situation.

This symbol indicates a DON'T. It will be accompanied by instructions on something you must not do.

NOTE Special information.

2.2. Product Handling

PRODUCT HANDLING ⚠ **WARNING**
Operate this device in a safe manner. Operating the scanner while operating machinery or a vehicle can be distracting. No other equipment should be operated while using this product.
Do not throw this device into a fire. Doing so may cause the battery case to burst, resulting in injury or possibly acting as an accelerant for the fire. Do not immerse this product. Do not insert foreign substances into the device. Doing so may short-circuit or overheat the battery, resulting in fire or electric shock. Do not attempt to modify or update this device. Do not use this product in the following areas. Doing so may cause fire, electric shock, malfunction, or radio interference: • In areas exposed to direct sunlight for long periods of time • In dusty environments • Near water or in extremely high humidity or other liquids • Near heat sources, such as radiators, heat registers, stoves, or other types of apparatus that produce heat • Near microwaves, medical devices, or low-power radio stations. Read more in the Medical equipment and Radio equipment sections. Do not use this product near flammable substances (such as gas and explosives).

PRODUCT HANDLING ⚠ **CAUTION**
When condensation occurs, such as when moving the unit from a cold to a warm environment, dry the scanner before using it. When cleaning this product, rub gently with either a soft dry cloth or a damp cloth with mild detergent. Do not use solvents; they may discolor the device.
Do not drop the unit or set it on an unstable surface from which it could fall. Do not expose the battery pack to liquids or allow the battery contacts to get wet. For instance, do not open the battery compartment in areas where water might come in contact with the battery.

2.3. Medical Equipment

MEDICAL EQUIPMENT ⚠ **WARNING**
Radio frequency energy from wireless devices may affect some sensitive electronic medical equipment. In order to avoid interference with the operation of this equipment, wireless devices should be switched off when requested in hospitals, clinics, or health care facilities. Some medical device manufacturers have guidelines for the operation of wireless devices near or around their equipment. If this equipment is to be used in the vicinity of life-critical medical devices (e.g., pacemakers), please consult with the medical device manufacturer's guidelines for safe operating distances and procedures.

2.4. Radio Equipment

This device complies with Part 15 of the FCC Rules, which states that this device may not cause harmful interference and this device must accept any interference received, including interference that may cause undesired operation.

Note: 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 to an outlet on a circuit different from that to which the receiver is connected.
- Consult an experienced radio/TV technician for help.

In accordance with FCC 15.21, changes and modifications not expressly approved by the manufacturer will void the user's authority to operate the equipment. These products are labeled with an FCC ID number. This number might be present in the battery compartment or on the product name label.

RADIO EQUIPMENT ⚠ **CAUTION**	
	To comply with FCC RF exposure compliance requirements, a separation distance of at least 2 inches must be maintained between the antenna of this devices and all person (excluding hands, wrist, feet and ankles) during normal operation.
	This device is not specified or designed to be worn on the body. Use of any body worn accessories may not ensure compliance with the FCC RF exposure guidelines. Please avoid the use of third party belt-clips and holsters with metal parts as they may affect FCC RF exposure compliance.

2.5. Battery Handling

This section describes safety precautions regarding the product's batteries.

BATTERY HANDLING ⚠ **WARNING**
If liquid from a leaking battery pack gets in the eyes, wash them with clean water and consult a physician immediately. Do not attempt to modify or alter the battery. Doing so may cause the battery pack to generate heat, or lead to burst, leakage, explosion or ignite: • Do not pierce the battery pack with nails or drills, or strike the battery pack with a hammer. • Do not step on the battery pack or otherwise expose it to strong impacts, shocks or excessive force. • Do not disassemble or modify the battery pack. • Do not put battery packs into a fire or expose them to excessive heat. • Do not short the power leads on the battery pack. If the (+) and (-) terminals come in contact with metals (such as a necklace or hairpin), short-circuiting occurs. Do not load the battery pack with its (+) and (-) terminals reversed.

BATTERY HANDLING ⚠ **CAUTION**
When the device is not in use for a long period of time remove the battery pack. Over time, batteries left in an unused device may leak, causing corrosion and resulting in product malfunction. Use the original Opticon battery charger and the original Opticon battery. Otherwise, the product can be damaged, or the battery life expectancy can be reduced. To extend battery operation time, switch the product off when the product is not in use.
Do not throw empty or end-of-life batteries in a home waste bin. Check the local regulations for proper battery disposal. This makes it possible to collect and recycle used batteries and to save the environment.

Note: The batteries used in Opticon products comply with California Perchlorate Best Management Practices Regulations and the Law for the Promotion of Utilization of Recyclable Resources (Japan).

3. Package Contents and Detailed View

The package contents are listed below. Contact a sales representative if there are missing or damaged parts.

- OPI 4002 (scanner) with battery*
- Hand strap
- OPA 1001 (USB dongle)
- Dedicated AC adapter (6V/750mA)
- Instruction manual (this document)

3.1. Scanner (OPI 4002)

Figure 1 and Table 1 identify the scanner components.

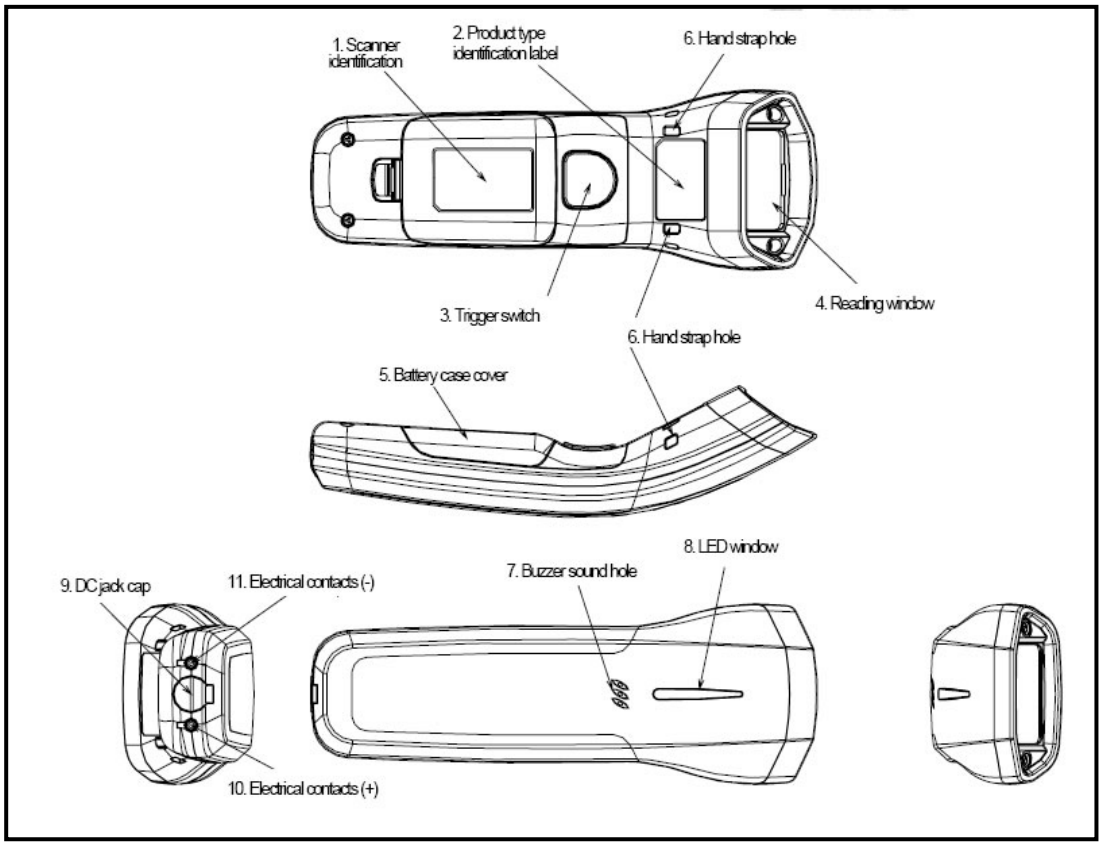

Figure 1: OPI 4002 handheld scanner

ID#	Name	Function
1.	Scanner identification	
2.	Product type identification label	Wireless certification label
3.	Trigger switch	Press the switch when scanning a barcode.
4.	Reading window	LED light for barcode reading will be emitted from here. The camera module (consisting of lighting LED, aiming LED and light detecting lens) is equipped from inside this window.
5.	Battery case cover	Protect the battery from moisture, dust etc.
6.	Hand strap hook	Attach hand strap here.
7.	Speaker	Emits a “beep” indicating a successful scan.
8.	LED window	Shows the status of scanning, transmission of barcode data to USB dongle, charging, and remaining battery power.
9.	DC jack cap	A cap to protect DC jack. Uncap when charging the scanner by plugging the dedicated AC adapter (accessory) directly into it.
10.	Electrical contacts (+)*	Positive contact point from charging base.
11.	Electrical contacts (-)*	Negative contact point for the charging base.
	* When using the dedicated charger CHG 4001 (optional), the power will be supplied via the feeding terminals.	

Table 1: OPI 4002 Handheld Scanner components

3.1.1. Handheld Scanner Hand Strap

Use the hand strap (Figure 2) to avoid dropping the handheld scanner while carrying it. Attach the strap to the scanner by threading it through the hand strap holes on either the left side or right side of the scanner.

Important: Do not swing the scanner by the strap!

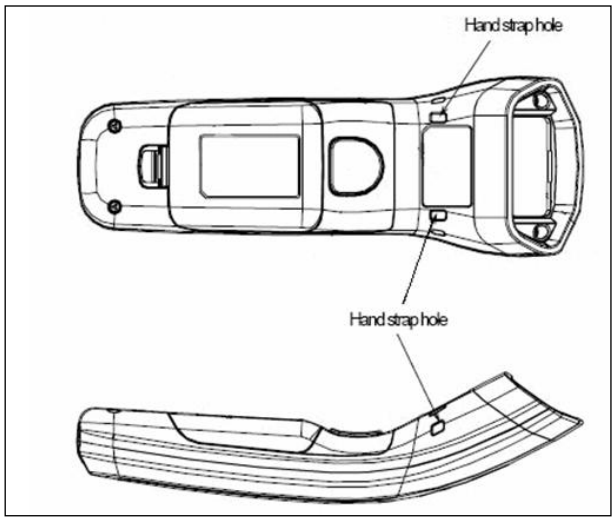

Figure 2: Strap attachments

3.2. USB Dongle (OPA 1001)

A dongle is a mechanism for ensuring that only authorized users can copy or use specific software applications. Common mechanisms include a hardware key that plugs into a parallel, serial, or USB port on a computer and that the software application accesses for verification before continuing to run.

The USB dongle (OPA 1001) contains the receiver port for the handheld scanner. For the scanner to function, you must connect the dongle between the scanner and the host computer's USB port. The OPA 1001 dongle supports USB version 1.1.

3.2.1. USB Dongle LED Indicator

Table 2 illustrates the status of the dongle based on color changes to its LED.

Color	Indication	Description
Orange	Solid	Scanner is initializing. Color will remain Orange until the process between host computer and USB is completed.
Green	Blinking	Awaiting data reception.
	Solid	Data is being received.

Table 2: OPA 1001 USB Dongle LED Indicator

Figure 3 shows the dongle and identifies its components.

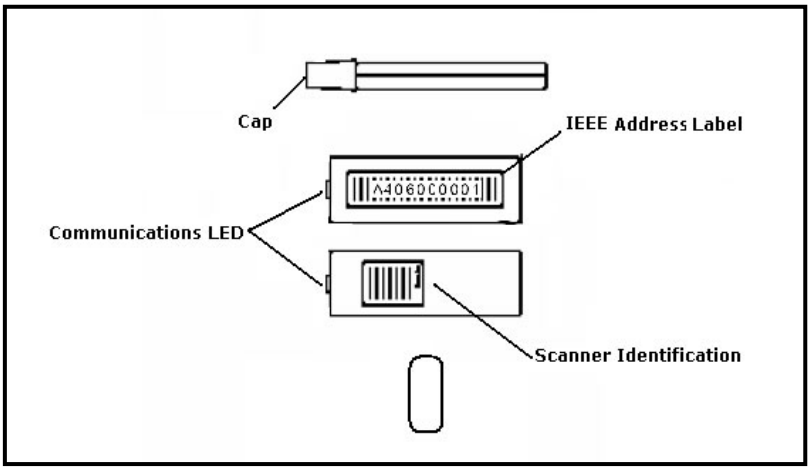

Figure 3: OPA 1001 USB dongle

Note: When installing the scanner on the PC, if the position of the IEEE address label makes the barcode unreadable, move the label onto the PC so the barcode can be read.

Figure 4 shows a sample IEEE address label similar to the one you will find on the USB dongle included with the scanner.

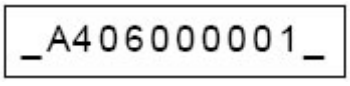

Figure 4: Sample IEEE address label

3.3. CHG 4001 (Charging Cradle for OPI 4002 Handheld Scanner)

Figure 5 and Table 3 describe the handheld scanner charging cradle and its components.

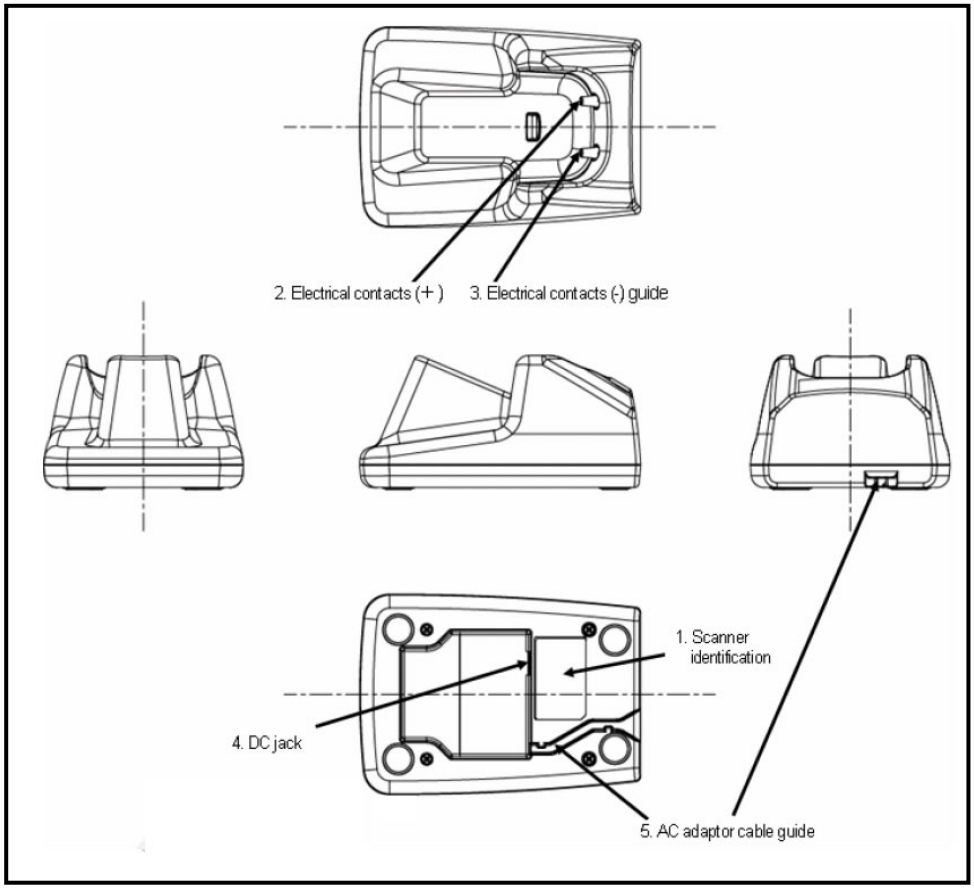

Figure 5: CHG 4001 charging cradle

ID#	Name	Functions
1.	Scanner identification serial number	Identifies product and serial number.
2.	Electrical contacts (+)	Positive contact feed powering the electrical contacts of the scanner.
3.	Electrical contacts (-)	Negative contact feed powering the electrical contacts of the scanner.
4.	DC jack	Connect the dedicated AC adaptor.
5.	AC adaptor cable guide	Install the dedicated AC adaptor cable along the guide.

Table 3: CHG 4001 charging cradle components

3.3.1. Battery Charging Time

The scanner battery must be fully charged before use. A completely discharged battery can be fully recharged in approximately three hours.

4. Battery Pack

By default, the scanner is in Power Saving mode. To power on the unit, press the trigger key for a few seconds. If the scanner is not in use for a while, it will go into sleep mode and the trigger key must be pressed for a few seconds before scanning to reactivate the unit.

To fully charge the main battery, connect the dedicated AC adapter or plug the scanner into the charging cradle.

4.1. Using the Charging Cradle

Figure 6 shows the procedure for inserting the OPI 4002 handheld scanner into the CHG 4001 charging cradle.

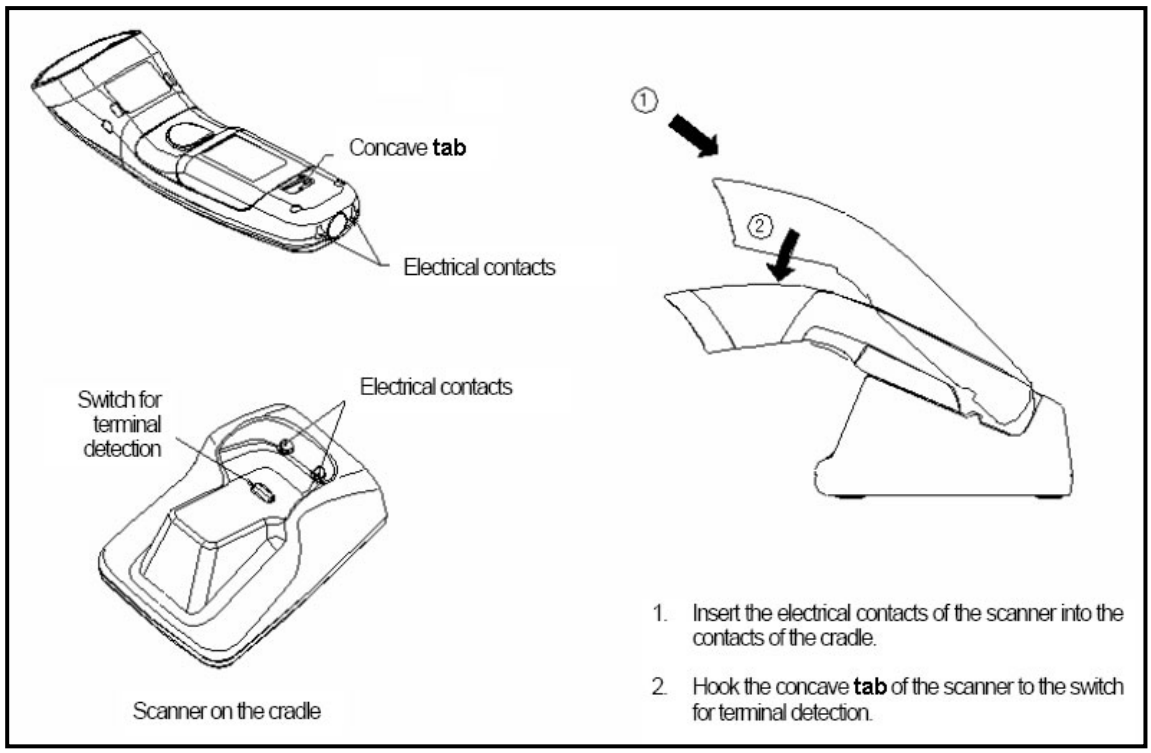

Figure 6: Inserting the scanner into the charging cradle

4.2. Scanner LED Indicator State

Table 4 lists the state of the scanner based on the scanner LED.

Color	Indication	Description
Green	Good Read	A barcode was successfully decoded.
Red	Blinking->Transmission error	There was a data transmission error to USB dongle.
Red	Charging	During charging on the cradle.
Green	Green -> Red	Changing color from green to red when the battery is full charged.
Red	Blinking	Battery voltage drop when pressing the trigger key and charging is needed. Cannot read any barcodes.

Table 4: Scanner status—LED indicator state

4.3. Replacing the Handheld Scanner Battery

Figure 7 shows the procedure for removing and replacing the battery, which is located in the handle of the handheld scanner.

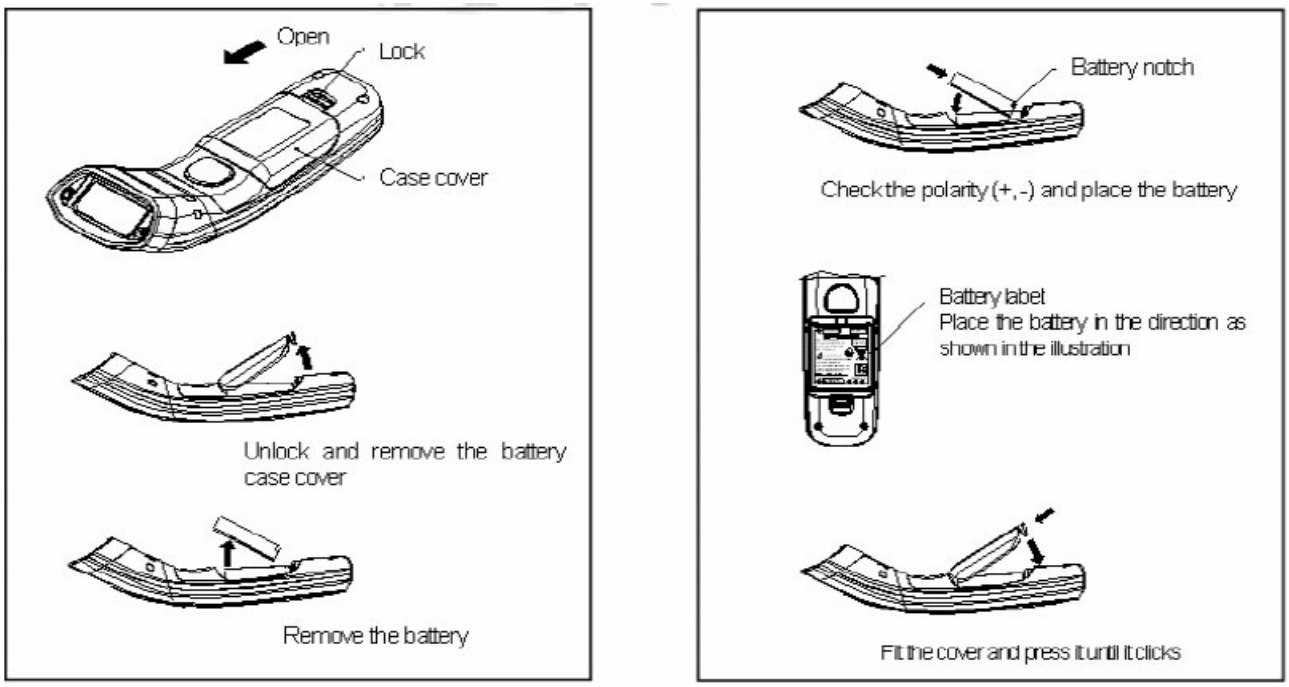

Figure 7: Replacing the scanner battery

The illustration on the left contains the procedure from removing the cover and then the battery itself. The illustration on the right shows the process in reverse.

5. Wireless Connection

The interface used by the OPI 4002 Handheld Scanner and the OPA 1001 USB Dongle complies with the wireless communication standard IEEE 802.15.4. The dongle is a receiver for the scanner.

5.1. Wireless Specification

- Connection: USB Dongle: 1, Scanner: 1
- Connection Mode: Address recognition (perform the communication by recognizing registered address)
- Encryption: Supports the 128-bit Advanced Encryption Standard (AES). AES (also known as Rijndael) is a block cipher adopted as an encryption standard by the U.S. government. The U.S. National Security Council adopted AES in 2002 as a standard to transmit encrypted sensitive information.
- Distance: Approximately 30 m (depends on environment)

5.2. Settings via Menu Barcodes

The wireless connection can be configured by reading the barcodes listed in this document, beginning on page 23.

- Register the scanner with the host computer by scanning the IEEE address barcode label on the USB dongle (see 5.4.2 Connecting the Scanner on page 17).
- Wireless channel settings (set the communication channel of the scanner and dongle)
- Communication control settings

5.3. Memorizing Settings

The scanner can temporarily memorize barcode data in case the scanner loses its connection, such as when it is out of communication range. The maximum available memory is 100 KB.

Note: This is an optional setting and is disabled by default.

When the scanner is connected again, the temporarily stored data is automatically transmitted to the computer.

- Automatic data transmission is performed in a random period between 1.0 to 2.0 seconds.
- All memorized data is deleted if the Clear All Memorized Data (+-MCLR-+) barcode label is read or if the wireless address is changed during data transmission with connection loss (Orange LED blinking).

Note: If reading the Data Memorizing Disabled label, the barcode cannot be read if the connection is lost.

Note: If reading the Data Memorizing Enabled label, a beep goes off when memory is full and the barcode cannot be read any more. When the scanner is connected again, the memorized data is automatically transmitted to the computer.

5.4. USB Dongle

The USB dongle (OPA 1001) acts as an HID keyboard interface and is supported on Microsoft Windows 2000 through Vista.

5.4.1. Installing the Dongle

Connect the USB dongle to the host computer directly or through a commercially available extension cable.

The Windows standard HID device driver is installed automatically when connecting the USB dongle to the host computer's USB port.

During initialization, the LED turns orange. The dongle LED turns green after it is initialized and a connection is made.

5.4.2. Connecting the Scanner

1. Connect the USB dongle to the host computer and make sure a green LED is blinking.
2. Press the trigger key to start the reading operation.
3. Scan the IEEE address barcode label "A4xxxxxxxx" on the USB dongle to register the scanner. The connection is complete and you can start barcode reading.

6. Scanning a Barcode

1. Remove the scanner from its cradle (if it is docked).
2. Press the trigger switch. The scanner's LED emits a beam of light to start the scanning.

   Note: If the scanner is not charged or the battery's charge is low, the scanner will not function.
3. Aim the light beam at the target barcode.
4. The scanner will beep if the scan has been successful. The OPI 4001 Handheld Scanner will not beep if it does not scan a barcode and the light beam will turn off after 3 seconds of pressing the trigger.

   Note: The aiming pattern does not indicate an exact scannable width or distance between a scanner and a barcode.

6.1. Aiming Guide

The following chart is an aiming guide that approximates the conditions for achieving a proper scan.

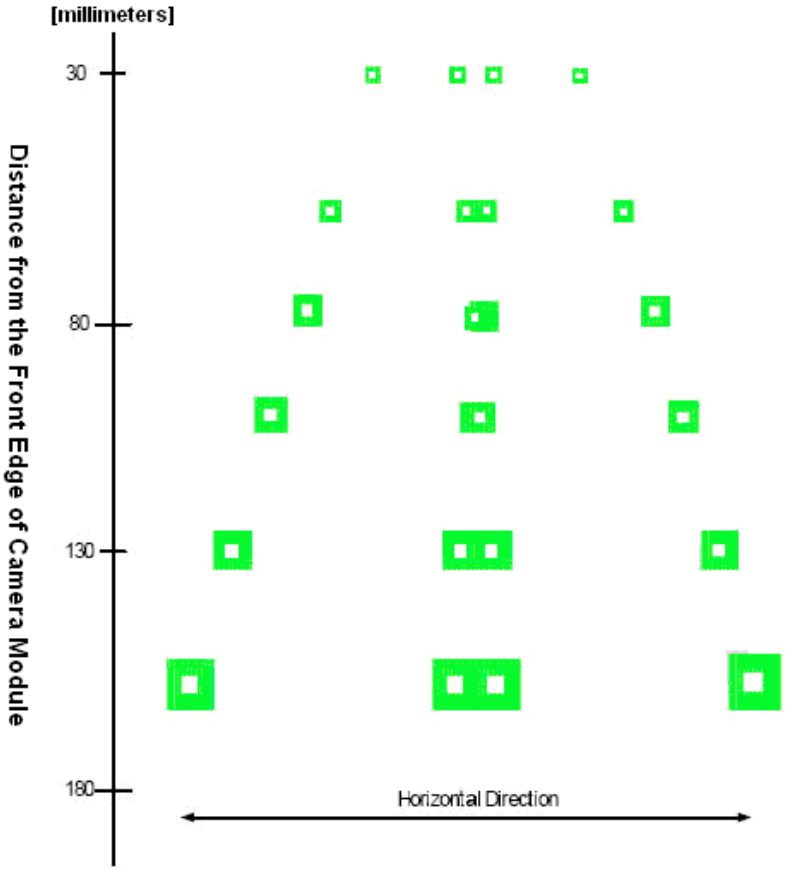

Figure 8: Aiming guide for barcode scanning

A recommended aiming point is where two LED light patterns (green square-shaped symbols on the chart) overlap or are positioned together.

6.2. Using the Aiming Guide to Scan

1. To scan a barcode within an aiming range:
    - Make sure that two central LED light patterns overlap each other on the chart.
    - Locate the center of the overlapped LED light pattern on the center of the barcode to scan.
2. To scan a barcode wider than an aiming range:
    - Aim the barcode from farther away.
    - Make sure that the barcode is between two LED light patterns at right and left ends.

    Note: Due to specular reflection (mirror-like reflection of light), scanning performance may differ depending on the media on which the target barcode is printed. Angle the scanner to about 15 degrees if you have difficulties in scanning due to specular reflection.

7. Appendix A: Default Settings

7.1. Default Settings 1: Readable Codes

Refer to the Product Specification Manual and the Universal Menu Book for readable barcodes. Table 5 shows a list of default readable codes.

Code type		Reading	Transmit Code Length	Transmit CD	Calculate CD	Transmit Other	Prefix Settings	Suffix Settings
UPC-A		■	X	■	■		■	CR
UPC-A Add-on		X	X	■	■		■	CR
UPC-E		■	X	X	■		■	CR
UPC-E Add-on		X	X	■	■		■	CR
EAN-13		■	X	■	■		■	CR
EAN-13 Add-on		X	X	■	■		■	CR
EAN-8		■	X	■	■		■	CR
EAN-8 Add-on		X	X	■	■		■	CR
Aztec Code		■	X	X	■		■	CR
Aztec Runes		X	X	X	■		■	CR
Code39		■	X	■	X	Not transmit ST/SP	■	CR
Code93		■	X	■	■		■	CR
Code128		■	X	■	■		■	CR
Data Matrix (ECC200)		■	X	X	■		■	CR
Data Matrix (ECC0-140)		■	X	X	■		■	CR
IATA		■	X	■	■		■	CR
Industrial 2of5		■	X	■	X		■	CR
Interleaved 2of5		■	X	■	X		■	CR
Maxi Code		■	X	X	■		■	CR
Micro PDF417		■	X	X	■		■	CR
PDF417		■	X	X	■		■	CR
MSI/Plessey		■	X	■	■		■	CR
NW-7 (Codabar)		■	X	■	X	Not transmit ST/SP	■	CR
QR CODE		■	X	X	■		■	CR
RSS-14	Standard Truncated							

Code type		Reading	Transmit Code Length	Transmit CD	Calculate CD	Transmit Other	Prefix Settings	Suffix Settings
	Stacked Stacked Omni-directional	■	X	X	■		■	CR
RSS Limited		X	■	X	X	■	■	
RSS Expanded	Standard	■	X	X	■		■	CR
	Stacked							
	EAN-13 CCB							
Composite EAN	EAN-13 CCA	X	X	X	■		■	CR
	EAN-13 CCB							
	EAN-8 CCA							
	EAN-8 CCB							
Composite UPC	UPC-E CCA							
	UPC-E CCB							
	UPC-A CCA							
	UPC-A CCB							
Composite RSS	RSS-14 CCA	X	X	X	■		■	CR
	RSS-14 CCB							
	RSS Limited CCA							
	RSS Limited CCB							
	RSS Expanded CCA							
	RSS Expanded CCB							
Composite UCC/EAN-128	UCC/EAN-128 CCA	X	X	X	■		■	CR
	UCC/EAN-128 CCB							
	UCC/EAN-128 CCC							

Table 5: Default settings: readable codes

Notes:

1) In the Reading column, "■" means Enable Reading and "X" means Disable Reading.

2) In the Transmit Code Length column, "■" means Transmit Code Length and "X" means "Do Not Transmit Code Length.

3) In the Transmit CD column, "■" means Transmit Check Digit and "X" means Do Not Transmit Check Digit.

4) In the Calculate CD column, "■" means Calculate Check Digit and "X" means Do Not Calculate Check Digit.

5) In the Prefix Settings column, "■" means No Prefix Setting.

7.2. Default Settings 2: Read Options, Trigger, Buzzer

Item	Default settings
Setting the number of characters	Fixed length OFF all codes
Read mode	Multiple read
Inter-character gap check (NW-7)	Character *1 > Inter-character gap
Multiple columns read (barcode only)	
Disabled	
Trigger switch	Enabled
Read time	2 seconds
Buzzer durations	200 ms

Table 6: Defaults: Settings, non-communications related

7.3. Default Settings 3: Communication Settings

Item	Default settings
IEEE address	Disabled
Wireless channel	CH15
Encryption	Enabled
Memorizing	Disabled

Table 7: Defaults: Settings, communications related

8. Appendix B: Menu Barcodes

This section contains the menu barcode labels for the OPI 4002 default settings. Other menu labels, such as Code Options, String Options, Read Options, and Indicator Options are listed in the Universal Menu Book. Refer to this guide when programming the scanner for optimal performance.

8.1. Setting Methods

There are two ways to set the required options: by scanning a Code39 barcode or by scanning a QR code.

8.1.1. Scanning Code39 Barcodes

To set the required options:

- Scan the Set label.
- Scan the required label.
- Scan the End label in sequence. If several labels in the same option are read, the **last** label read is enabled.

8.1.2. Scanning a QR Code

Scan the QR code label directly without reading the Set and End labels.

8.2. Default (Interface) Code Labels

Encryption is enabled by default.

CODE39 labels			QR code label
SET	ZZ		
IEEE802.15.4 HID	C02		
END	ZZ		

Table 8: Default (interface) code labels list

8.3. Changing the Wireless Communication Channel

Use the following barcodes to change the wireless communication channel.

Code39 labels			QR code labels
SET	ZZ		-
Communication channels * Alternative (Factory default setting is printed in bold)	CH11		
	CH12		
	CH13		
	CH14		
	CH15		
	CH16		
	CH17		
	CH18		
	CH19		
	CH20		

Code39 labels			QR code labels
	CH21		
	CH22		
	CH23		
	CH24		
	CH25		
	CH26		
END	ZZ		-

Table 9: Wireless communication channel barcodes

8.4. Memorizing Options

Code39 labels				QR code labels
SET	ZZ			-
Memorizing (Factory default setting is printed in bold)	DTME	Enabled		
	DTMD	**Disabled**		
END	ZZ			-

Table 10: Memorizing options code labels

8.5. Clear All Memorized Data

Clear all memorized data (ID barcode only)		+-MCLR-+

Table 11: Clear All Memorized Data code labels

8.6. Non-Printable Characters

SET	ZZ		
Non-Printable ASCII Character substitution (default in bold)	NPSE	Enabled - substitute non-printable ASCII characters (HT)	
	NPSD	**Disabled - transmit ASCII text as-is (^I)**	
	NPSB	Block Non-Printable Characters	
END	ZZ		

Table 12: Substitution of non-printable ASCII characters code labels