

NORDIC ID EXA31

USER GUIDE



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1. GETTING STARTED

1.1. GENERAL

Nordic ID EXA31 provides UHF RFID reader capabilities and optional 1D/2D barcode scanning functionalities for host devices, such as smartphones, tablets or computers; Android, iOS or Windows 10. Nordic ID EXA31 is used with the host devices via Bluetooth® Low Energy wireless technology.

1.2. AVAILABLE VARIANTS

Nordic ID EXA31 is available in 4 different variants:

CODE	FREQUENCY	2D IMAGER
IWB00001	868MHz (ETSI)	Yes
IWB00003	868MHz (ETSI)	No
IWB00004	915MHz (FCC)	Yes
IWB00005	915MHz (FCC)	No

1.3. AVAILABLE ACCESSORIES

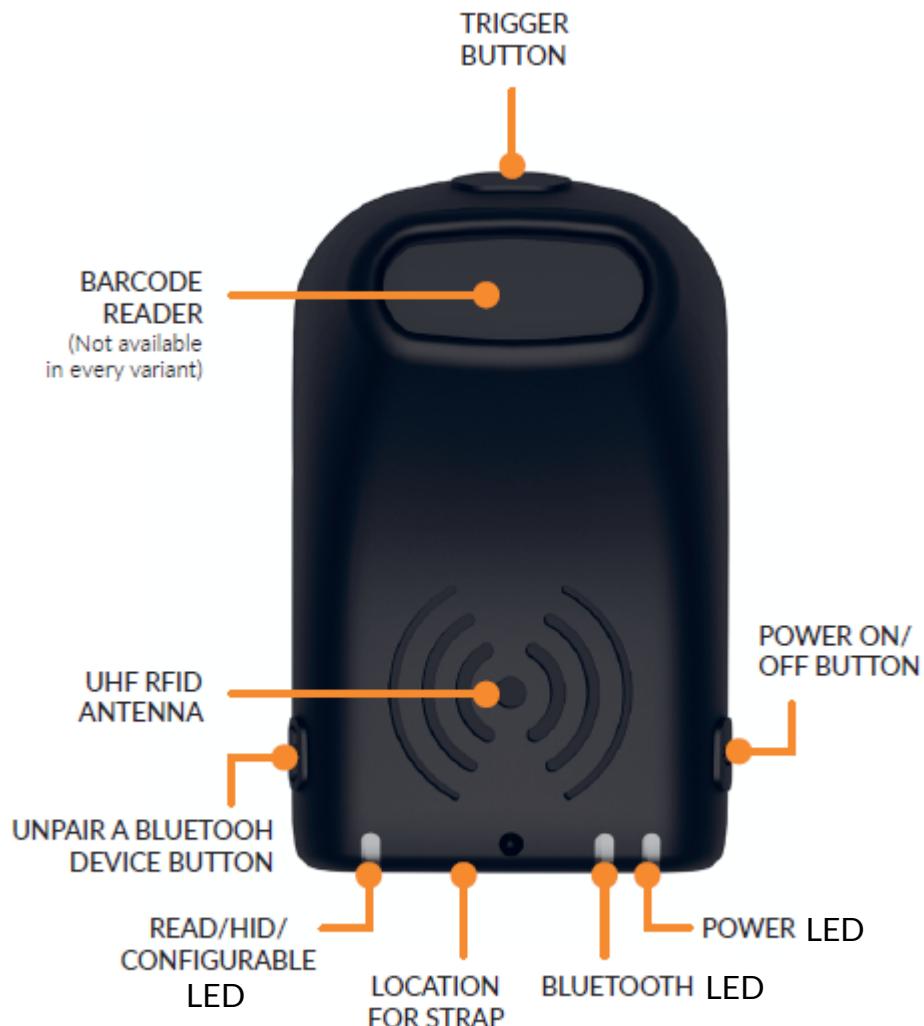
CODE	DESCRIPTION
ACN00173	Nordic ID USB Charger for Nordic ID EXA31
ACP00097	Quad Lock Universal Adaptor v1. The Quad Lock Universal Adaptor with 3M™ adhesive is a super thin adaptor that is compatible with all Quad Lock™ mounts. The Quad Lock Universal Adaptor designed to be used only once, it is not re-stickable.

1.4. PACKAGE CONTENT

Nordic ID EXA31 package contains following items

- Nordic ID EXA31
- Battery (installed)
- Safety and regulations card

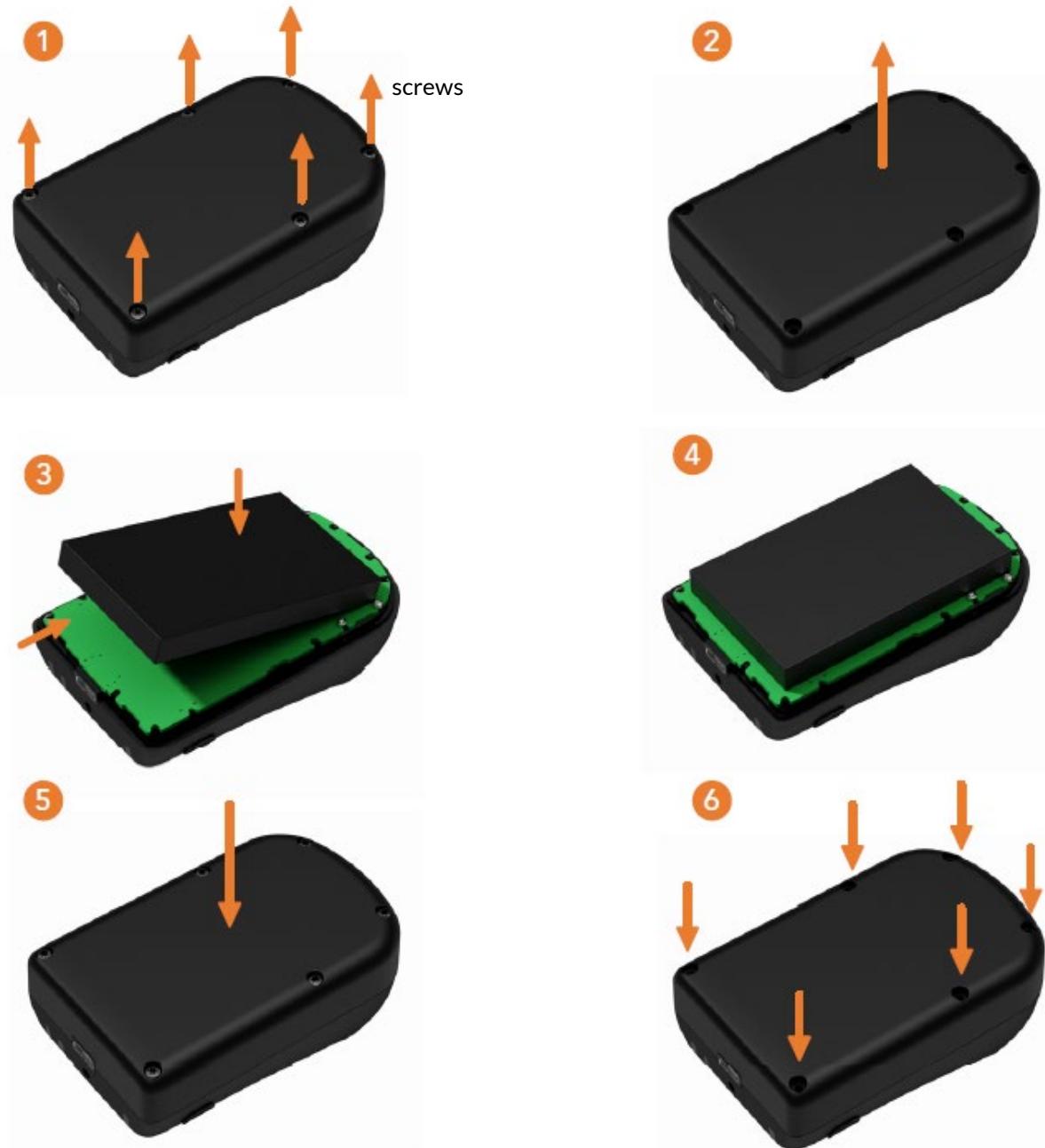
1.5. FEATURES OVERVIEW



Picture 1. Key features of Nordic ID EXA31

When holding the Nordic ID EXA31 device, please avoid covering the UHF RFID antenna with the hand.

1.6. REMOVING BATTERY



Picture 2. Removing battery

1.7. CHARGING

Nordic ID EXA31 can be charged via USB charger. Maximum charging power is 2.5W (5V @ 500mA). Charging time from 0 – 100% is about 4 hours. The USB charger needs to have a micro USB connector and the recommended charging power is at least 2.5W (5V @ 500mA).

Charging status is indicated by Power LED. Please see section 1.11.2.3 for information how the Power LED functions in different situations.



Picture 1 Charging Nordic ID EXA31 via USB charger

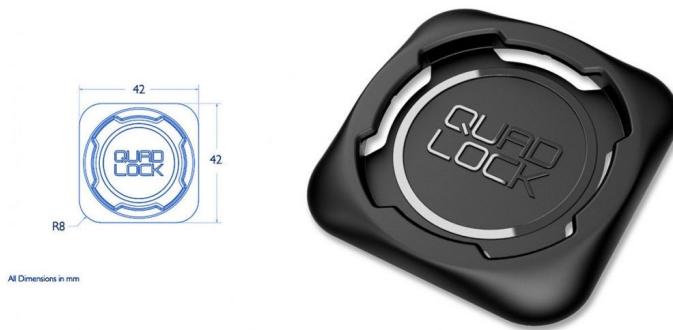
NOTE! The USB charger is sold separately by Nordic ID.

1.8. FASTENING

Nordic ID EXA31 can be fastened with several methods. Only Quad Lock fastening is described in the user guide.

1.8.1. QUAD LOCK® FASTENING

The Quad Lock fastening is a popular and easy-to-use fastening system. The Quad Lock fastening system provides strong and secure fastening and is suitable for different kind of host devices. Please visit Quad Lock web pages for more information about different adapters.



Fastening of Nordic ID EXA31 with the Quad Lock is easy. The first step is to attach a Quad Lock adapter on the bottom of Nordic ID EXA31. The second step is to fasten Nordic ID EXA31 with Quad Lock mount wherever needed.

NOTE! Quad Lock® universal adaptor is sold separately

1.9. CONNECTIONS

Nordic ID EXA31 supports only Bluetooth Low Energy Class 2 connection for host devices. Supported Bluetooth Low Energy versions are 4.0 – 4.2 and supported profiles are GATT (generic data transfer) and HID (keyboard emulation).

NOTE! Bluetooth Low Energy needs to be supported by host device

1.9.1. CONNECTING WITH HOST DEVICE

There are three ways to connect Nordic ID EXA with host device, being the third one (Nordic ID Smart Pair) the most advanced and easiest way to connect.

1. Connect without pairing (this is the most straightforward way)

Nordic ID EXA will advertise itself via Bluetooth until the host device connects to it. Bluetooth connection remains active until the host device closes the connection. Once the connection is closed Nordic ID EXA31 will start advertising itself again and any host device can connect to it.

2. Connect with pairing

By default, pairing support is disabled (since firmware version 2.2.1). When Nordic ID EXA31 is paired with the host device, applications (like Nordic ID RFID demo) connects to it automatically. Connection remains active if the host device is in Bluetooth range.

3. Connect with Nordic ID Smart Pair feature

The new awesome Nordic ID Smart Pair feature provides an exceptionally easy way to connect and disconnect host device to our EXA readers. Just select “Nordic ID Smart Pair” from “Connection” listing in Nordic ID RFID Demo and host device starts looking for the EXA readers.

1.9.1.1. PAIRING AND UNPAIRING NORDIC ID EXA31 WITH A HOST DEVICE

By default, pairing support is disabled (since firmware 2.2.1). Before Nordic ID EXA31 can be paired with the host device, pairing support needs to be enabled. This can be done with two different ways that are:

1. Using Nordic ID RFID demo. Connect Nordic ID EXA31 to host device and go to Settings -> Reader -> Host device connection -> check Pairing enabled tick box
2. Reading configuration barcodes to enable/disable pairing support.
 - a. ALLOWPAIRON = Pairing enabled
 - b. ALLOWPAIROFF = Pairing disabled



NOTE! Barcode configuration codes can be read only when there is no active Bluetooth connection with the host device

Nordic ID EXA31 can be paired based on the instructions below once pairing has been enabled.

1. Turn Bluetooth of the host device On.
NOTE: Android 6.0 or newer needs location to be enabled also
2. Power on the Nordic ID EXA31 by pressing the power button for 2...3 seconds
3. Open Bluetooth connection settings of host device and you should see "EXA31 XXXXXX" in the list
4. Select "EXA31 XXXXXX" from the list in order pair your host device with the Nordic ID EXA31

NOTE! XXXXX is a serial number of the Nordic ID EXA31

iOS devices typically prompt "pairing request" message box if Nordic ID EXA31 supports pairing. In case pairing is not needed, user can press "cancel" button and device connect without the pairing. If iOS device is going to be used without the pairing, please disable pairing support and then "pairing request" prompt doesn't appear anymore.

Other host devices can't connect to Nordic ID EXA31 until pairing information has been cleared from the host device and Nordic ID EXA31. Unpairing can be done based on information found from section 1.11.1.3 or using clear Bluetooth pairings barcode. Read barcode below to clear Bluetooth pairings from the Nordic ID EXA31.



NOTE! Barcode configuration codes can be read only when there is no active Bluetooth connection with the host device

1.9.1.2. CONNECTING WITH HOST DEVICE VIA HID MODE

In this mode, the Nordic ID EXA31 functions and communicates in a similar manner as a keyboard. Therefore, the device will work with any application that supports an active cursor on input fields, for example web browser applications. When operating in HID mode, the Nordic ID EXA31 needs to be paired with the host device and configured for the HID mode.

NOTE! When the Nordic ID EXA31 is configured for HID mode: remember that you will need to reconnect the Nordic ID EXA31 after using non-HID applications (such as Nordic ID RFID Demo). This will enable the HID mode again. The easiest way to do this is turn off/on Bluetooth of host device.

1.9.1.3. CONNECTING WITH NORDIC ID SMART PAIR FEATURE

When using Nordic ID EXA31, you will probably hold (or wear) your mobile device on one hand and the EXA reader on another hand, as separated devices. Nordic ID Smart Pair is aware of this and thus it keeps the connection even when they are far away from each other, so that you do not have to link both every time they get closer again.

- Connecting: One can connect the host device to the EXA reader just by placing host device close to the EXA reader.
- Disconnecting: The host device doesn't disconnect automatically when moved further away. Disconnecting will be done by pressing Power and Unpair buttons simultaneously 2 seconds (Read/HID LED stops blinking).

In this mode, the Nordic ID EXA31 keeps connected to host device even if it moves further away from Bluetooth range.

Requirements: Nordic ID RFID demo app 1.2.7.3 (or newer) and EXA31 with firmware 2.2.5 (or newer).

The Nordic ID Smart Pair feature is always enabled in Nordic ID RFID Wear OS app.

1.9.2. CONFIGURING HID MODE WITH BARCODE

Read barcode below to configure the Nordic ID EXA31 to desired HID mode. Please note barcode configuration codes can be read only when there is no active Bluetooth connection with the host device.

- HIDMODE0 = All HID modes disabled
- HIDMODE1 = HID barcode enabled
- HIDMODE2 = HID RFID enabled



Both HIDMODE1 and HIDMODE2 can be simultaneously enabled.

1.9.3. CONFIGURING HID MODE WITH APPLICATION

1. Install Nordic ID RFID Demo application (see section 2.1)
2. Connect your device
3. Confirm that pairing is enabled in reader settings
4. Turn on HID mode, RFID and/or barcode mode in reader settings
5. Close application and make sure Bluetooth connection is closed
6. Reboot your EXA31 device by pressing the power button for 2...3 seconds.

1.10. OPERATING WITH HID MODES

1.10.1. HID BARCODE ENABLED

Reading Barcode:

- Pressing trigger down → barcode aimer starts → Releasing trigger → scanning start
- When tag found, result is sent to HID immediately
- Pressing trigger down during scan → scanning aborted

1.10.2. HID RFID ENABLED

Reading RFID tags:

- Pressing trigger down → RFID reading starts
- Reader read tags and stores them in memory as long trigger is kept down. Short beep when new tags found
- Releasing trigger → Reading stops and tags in memory will be transmitted to HID. Short beep when single tag sent. If no tags found, double low note beeps.

NOTE! HID operation is slow and it's not very useful for cases where need to read and transfer high amount of tags (> 5)

1.10.3. BOTH: HID BARCODE & HID RFID ENABLED.

Activate Barcode reader:

- Trigger click (short press (<350ms) and released immediately) → Barcode scanning starts immediately without aiming.
- Trigger press and keeping down at least 350ms → Barcode aimer starts → Trigger released → scanning starts.

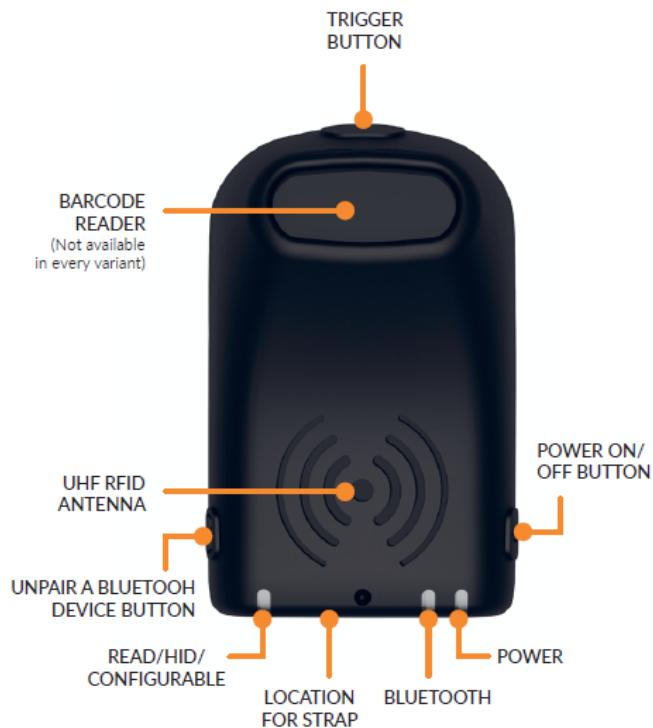
Activate RFID reader:

- Pressing trigger “double click” and keeping down → RFID reading starts. Searching tags. Beep when tags found.
- Releasing trigger → Reading stops and tags in memory will be transmitted to HID. Short beep when a single tag sent. If no tags found, double low note beeps.
- Pressing trigger during tag sending → aborted.
- Pressing trigger during barcode scanning → aborted.

1.11. USING THE READER

1.11.1. BUTTONS

Nordic ID EXA31 has three physical buttons for user interactions. Location of the buttons can be seen in Picture 2.



Picture 2 Location of the buttons

1.11.1.1. TRIGGER BUTTON

The trigger button is located at the top of the reader. It can be used to start/stop UHF RFID/barcode scanning and turn the reader on. When turning the reader on the trigger button needs to be pressed 0.5 seconds until blue LED starts blinking before it triggers. This ensures that accidental presses are avoided. Depending on the application in use, the trigger button starts/stops UHF RFID or barcode reading. By default, the first press of the button starts the reading and the second press of the button stops it.

NOTE! Button usage depends on the application in use.

1.11.1.2. POWER BUTTON

Power button turns reader On/Off. The power button needs to be pressed for about 2...3 seconds until red LED turns to green before it triggers, this ensures that accidental presses are avoided. The power button is disabled when Nordic ID EXA31 has an active Bluetooth connection with the host device.

NOTE! Reader can be powered down even though it has an active Bluetooth connection by pressing power button at least 7 seconds

1.11.1.3. UNPAIR A BLUETOOTH DEVICE BUTTON

If Nordic ID EXA31 is paired to the host device, it stores information about the paired devices and tries to connect automatically when turned on. Using the “Unpair a Bluetooth device” button clears the paired device from the memory of Nordic ID EXA31.

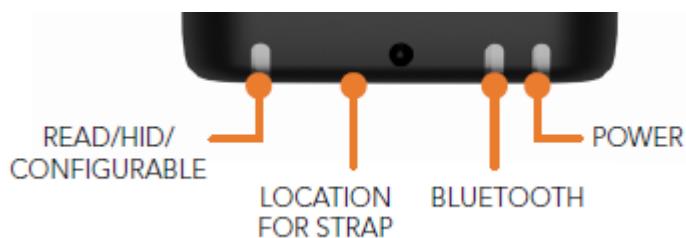
Unpairing:

- Make sure device is disconnected.
- Press and keep “Unpair” button down at least 3 second.
- When device beeps three times, pairing is cleared. Device may reboot.

NOTE! The “Unpair a Bluetooth device” button is disabled when the Nordic ID EXA31 has an active Bluetooth connection with host device

1.11.2. LED INDICATORS

Nordic ID EXA31 has three LEDs for user indications. Location of the LEDs (Read/HID/Configurable, Bluetooth and Power) can be seen in Picture 3.



Picture 3 Location of LEDs

1.11.2.1. READ/HID/CONFIGURABLE LED

By default, Read/HID/Configurable LED indicates whether RFID or barcode reading is active. The Read/HID/Configurable LED can be configured via API if needed.

- **RFID Read**
- **Barcode read**
- **No read**

1.11.2.2. BLUETOOTH LED

Bluetooth LED indicates whether the Bluetooth connection is On/Off or in search mode.

Bluetooth LED

- **BT On**
- **Ready to connect**
- **BT off**

1.11.2.3. POWER LED

The Power LED indicates whether the reader is On/Off and it also indicates the battery level of the reader. The colour of the Power LED indicates the battery level.

Power On	Power On
● Battery Full	● Battery Low
> 20 %	< 10 %
Power On	● Power Off
● Battery Medium	
10–20 %	

Blinking of the Power LED indicates that the device is charging. The battery level during charging is indicated by the colour of the blinking Power LED.

- **> 90 %**
- **30–90 %**
- **< 30 %**

1.11.3.BUZZER

The Nordic ID EXA31 includes a buzzer which can be used to give an audible indication to user. By default, the buzzer beeps in the following situations:

- The reader is turned On/Off
- Bluetooth unpair done
- Bluetooth is connected/disconnected
- During HID operations
- When barcode is read successfully

1.11.4.ANTENNAS

Nordic ID EXA31 is equipped with a circularly polarized UHF RFID antenna. Nominal read range is up to 2m / 6.6 ft.

NOTE! The reading range depends on used tag and environment

1.11.5.2D IMAGER

This section describes methods for configuring 2D imager of Nordic ID EXA31. The 2D imager module in use is Opticon MDI-4100 2D scan engine.

Opticon provides online configuration tools: <http://opticonconfigure.opticon.com/>

Standalone PC software: https://wiki.opticonusa.com/techsupport/en/Universal_Config_Tool_2D

There are three different ways to configure the 2D imager that are

1. Using configuration barcode
2. Using Nordic ID RFID demo application
3. Configuring via NUR Accessory extension API

1.11.5.1. USING CONFIGURATION BARCODES

The easiest way to configure 2D imager is to read configuration code with the 2D imager. Please use Opticon's configuration tools (see link above) for creating configuration barcode and print it onto paper. Read the configuration code with the 2D imager of Nordic ID EXA31 and new settings will be set and saved automatically. Please note barcode configuration codes can be read only when there is no active Bluetooth connection with the host device. Please find example configuration barcodes below. More 2D imager configuration barcodes can be found from APPENDIX 1.

1 - Enable 1D codes: Tri-Optic, Industrial 2 of 5, Code 39 and S-Code



@MENU_OPTO@ZZ@JZ@R7@B2@R9@ZZ@OTPO_UNEM@

2 - Disable 1D codes: Tri-Optic, Industrial 2 of 5, Code 39 and S-Code



@MENU_OPTO@ZZ@DDJ@X4K@VB@DDK@ZZ@OTPO_UNEM@

1.11.5.2. USING NORDIC ID RFID DEMO APPLICATION

Nordic ID RFID demo application allows testing of different kind of barcode configurations effortlessly. Configurations can be read and set from specific file. The specific file is a simple text file containing configuration command strings generated by the Opticon's configuration tool. The configuration settings of Nordic ID RFID demo applications can be accessed via Settings menu or barcode functionality.

Opticon's configuration tools do provide configuration strings. Barcode type must be 2D-Code like PDF417. Format of configuration string is:

@MENU_OPTO@ZZ@<config codes separated by @>@ZZ@OTPO_UNEM@

Opticon's configuration tools shows two or three letter configuration code for each configurable item.

Example:

Enable Tri-Optic = JZ, Enable Code39 = B2

Configuration string = "@MENU_OPTO@ZZ@JZ@B2@ZZ@OTPO_UNEM@"

Opticon's configuration tools shows two or three letter configuration code for each configurable item.

After sending configuration file to the reader, Nordic ID RFID demo will send "save settings" command automatically to the 2D imager. Source code of Nordic ID RFID demo is public, so one can study how 2D imager configuration using the specific files has been implemented on Android. See section 2.2 for more information.

1.11.5.3. CONFIGURING VIA NUR ACCESSORY EXTENSION API

NUR Accessory Extension API provides command for sending configuration string to the 2D imager:

```
byte [] imagerCmd (String cmd, int type);
cmd: Configuration string.
type: Type of imager in use (0= Opticon MDI-4100 2D scan engine)
```

Return value is byte array of response depending on command code(s) sent to the 2D imager. Null if command string is not valid. The first byte of array contains ACK (0x6 success) or NAK (0x15 fail).

example:

```
//Send Enable Tri-Optic and Enable Code39 commands
byte [] rsp = imagerCmd("@MENU_OPTO@ZZ@Z2@ZZ@OTPO_UNEM@", 0);

if(rsp[0] == null)
{
    //Not valid command
}
else if(rsp[0] == 0x6) //ACK
{
    //Config success!
}
else if(rsp[0] == 0x15) //NAK
{
    //Config failed!
}
```

After sending configuration to the 2D imager, settings are ready to use but next power down causes settings to lost. Therefore, it's important to save settings to volatile memory of imager.

```
//SAVE CONFIGURATION TO IMAGER MEMORY
imagerCmd ("@MENU_OPTO@ZZ@Z2@ZZ@OTPO_UNEM@", 0);
```

2. SOFTWARE

Nordic ID has taken an open source SW development approach in use with Nordic ID EXA31. Nordic ID provides the SDK along with the examples through the GitHub. Nordic ID EXA31 supports powerful NUR API so developers can use familiar NUR API for application development.

2.1. NORDIC ID RFID DEMO APPLICATIONS

Nordic ID provides feature rich yet easy-to-use RFID demo applications for iOS and Android platforms.

2.1.1. NORDIC ID RFID DEMO FOR ANDROID

Nordic ID RFID demo application for Android supports Android 5.0 and newer versions. The Nordic ID RFID demo application is available from the Google Play store.



2.1.2. NORDIC ID RFID DEMO FOR IOS

Nordic ID RFID demo application for iOS supports iOS 9 and newer versions. The Nordic ID RFID demo application is available from the Apple App store.



2.1.3. NORDIC ID KEYBOARD AND WEDGE SERVICE

Nordic ID Keyboard and Wedge service applications do provide wedge functionality for Android devices. Android 5.0 and newer versions are supported.



Nordic ID Keyboard



Nordic ID Wedge service

2.1.4. NORDIC ID SMART WEAR APP

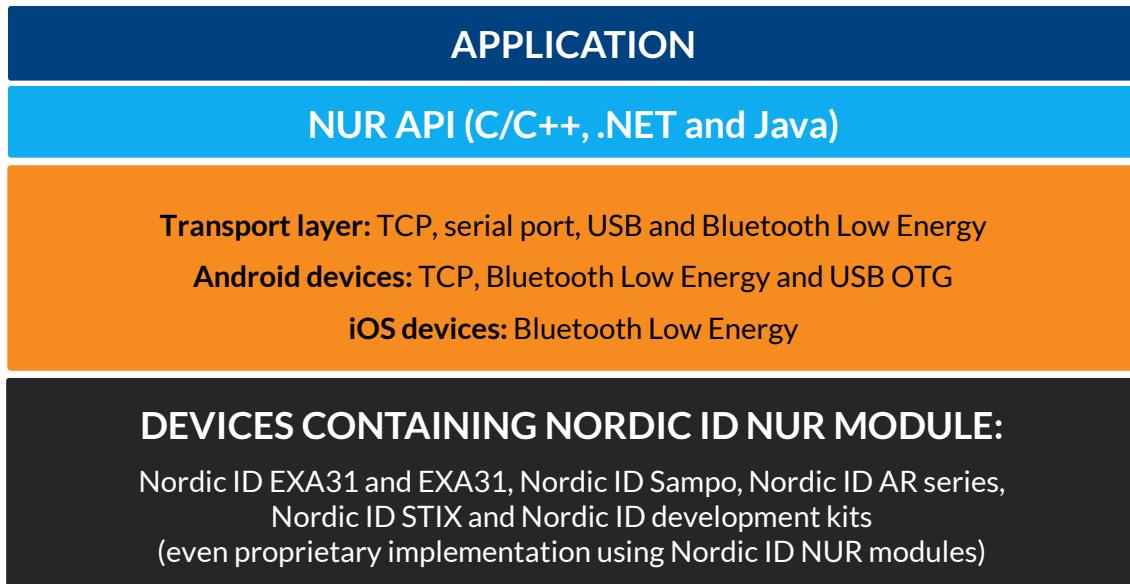
Nordic ID Smart Wear app for smartwatches supports Android Wear 2.0 or Wear OS 1.0 and newer versions. The Nordic ID RFID Smart Wear app is available from the Google Play store.



2.2. APPLICATION DEVELOPMENT

2.2.1. NUR API IN GENERAL

NUR API is an application programming interface for Nordic ID UHF RFID module. It provides control for all Nordic ID UHF RFID readers. The NUR API provides compatibility between Nordic ID UHF RFID reader from RFID functions perspective. The NUR API consists of application, NUR API, transport and HW layers as depicted in Picture 4.



Picture 4 NUR API architecture

2.2.2. APPLICATION DEVELOPMENT KIT

Nordic ID provides Software Development Kits (SDK) and code samples via GitHub for Android, iOS and Windows 10:

<https://github.com/NordicID/>

The Software Development Kits provide development basics for Nordic ID EXA31. Samples utilizing the Android, iOS and Windows 10 specific accessory extension used with Nordic ID EXA31 are available from GitHub as well (includes e.g. barcode and RFID HID). Samples utilizing NUR API in general are available for Android, iOS and Windows 10 (includes RFID generic operations such as write, locate etc.).

More information including source code and samples can be found from GitHub via:



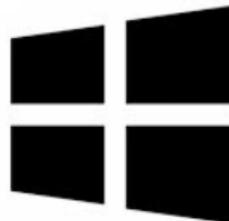
Android

https://github.com/NordicID/nur_nurapi_android



iOS

https://github.com/NordicID/nur_sample_ios



https://github.com/NordicID/nur_sample_windows/tree/master/Win10_UWPSample

2.3. FIRMWARE UPDATE

Firmware of Nordic ID EXA31 consists of four different firmware which are:

- NUR firmware (firmware of the NUR RFID module)
- NUR bootloader (bootloader of the NUR RFID module)
- Device firmware (firmware of the reader)
- Device bootloader (bootloader of the reader)

All the firmware can be updated by using Nordic ID RFID demo applications presented in section 2.1 or implementing update functionality to 3rd party application.

3. REGIONAL SETTINGS

Nordic ID UHF RFID readers do support operating frequency range between 860 - 960MHz. Some of the readers do cover full operating frequency band and some of them have two sub bands that are 868 ETSI band (865.6 - 867.6 MHz) and 915 FCC band (902 - 928 MHz). Regional organizations as ETSI and FCC have set rules and requirements for operating frequencies, output power and other RF parameters for the UHF RFID readers to comply local regional requirements. See variants in section 1.2.

Nordic ID has created set of regional settings in order to fulfil local regulations. Nordic ID is required to ensure compliance of Nordic ID products will remain after production. Solution for this is products including UHF RFID functionality will be set and locked in production based on customer order e.g. if a product is ordered to Europe, it will be locked to ETSI region. And for example, if a product is ordered to Australia region, then it's locked to Australia region. When a product is locked to individual region, it will comply local regulations of the region.

4. SERVICE AND SUPPORT

For technical enquiries regarding Nordic ID devices or software development, please contact our Technical Support:

E-mail: support@nordicid.com
Telephone: +358 2 727 7790

As a manufacturer, Nordic ID stands responsible for providing repair services for its devices during and after the warranty period. Together with partners Nordic ID serves customers globally. When your Nordic ID device needs repair, always use Nordic ID Service or our authorized service partners. We want to make sure that your Nordic ID product serves you the best possible way, and by using our preferred service partners the quality of the service is trustworthy and the spare parts are original. This way the existing product warranty remains, and you receive a 3-month service warranty for the repaired devices.

Nordic ID works together with full support and primary support partners. Full support partners can handle both warranty and non-warranty repairs on behalf of Nordic ID in their own regions. In addition, Nordic ID has a network of smaller repair centres, primary support partners, who offer the first line of support to their customers locally.

For any enquiries about Nordic ID repair service please contact:

E-mail: service@nordicid.com
Telephone: +358 2 727 7791

5. WARRANTY

Nordic ID warrants that the Products are at the time of delivery free from defects in materials and workmanship, provided the Products remain unmodified and are operated under normal and proper conditions. Warranty period is the longer of twenty-four (24) months from the date of delivery in case the Customer is end-customer or twenty-seven (27) months from the date of manufacture in case the Customer is reseller. Spare parts are warranted against defects in workmanship and materials for a period of ninety (90) days from the date of delivery to Customer.

For more detailed information about the warranty can be found from [Nordic ID Sales Terms](#).

6. RELATED DOCUMENTS AND CONTENT

- Nordic ID EXA31 datasheet
- Nordic ID EXA31 Quick Guide
- Nordic ID Safety and Regulations Guide
- Nordic ID GitHub account for developers (<https://github.com/NordicID>)

7. ABOUT NORDIC ID

Nordic ID is at the centre of today's real-time item tracking and reliable RFID technology. We help organizations fight the damaging effects of item loss, facilitate streamlined business procedures, and stay ahead of the competition.

We are ready to help you take advantage of our wide range of products and services designed to fit your needs. Contact us now, and we will help you to tackle your challenges and get your business to the next level.

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E-mail: info@nordicid.com



8. VERSION HISTORY

<u>Version</u>	<u>Date</u>	<u>Modifications</u>
1.0	19.8.2017	The first version
1.1	3.11.2017	Buzzer, firmware and regional settings sections added
1.2	10.1.2018	Connecting with host device, 2D imager and Nordic ID Keyboard and Wedge service sections added.
1.3	28.1.2018	Windows 10 support added to application development section. Android GitHub address updated.
1.4	13.12.2018	Nordic ID Smart Pair and Nordic ID Smart Wear app added
1.5	01.04.2021	New battery indications and detailed Nordic ID Smart Pair description

9. APPENDICES

9.1. APPENDIX 1 SAMPLE 2D IMAGER CONFIGURATION BARCODES

NOTE! Barcode configuration codes can be read only when there is no active Bluetooth connection with the host device

Code 39



Code39 Italian Pharmaceutical



Code 39 Full ASCII



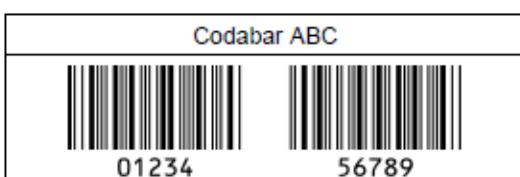
Tri-Optic



Codabar



Codabar ABC



Codabar CX



Industrial 2 of 5 / Interleaved 2 of 5



Interleaved 2 of 5



S-Code

