USER MANUAL

Nordic ID
RF601

Contents

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Disclaimer

Nordic ID products have not been designed, intended nor inspected to be used in any life support related applications nor as a part of any other critical system and are not granted functional warranty if used in any such applications.

RF601 contains a Class II laser device, which may cause injuries unless safety regulations and instructions are observed. Nordic ID may not be held responsible for any injuries or damage resulting from use in contradiction with the safety related instructions stated elsewhere within this manual or which are in contradiction to the general safetylines relating to Class II laser devices.

Nordic ID urges its customers to arrange proper and adequate user training, which includes safety issues to any personnel using, programming or otherwise handling RF601 hand terminals.

The sale, transfer and use of Nordic ID RF601 is subject to the then-current Nordic ID General Conditions of Sale and the then-current Nordic ID End User License Agreement, the then-current referring to the original purchase date.

Trademarks

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All terms mentioned in this User Manual that are known to be trademarks or service marks have been appropriately marked in the list below with either the ©, ® or the ™ symbol.

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User safety

CAUTION: In some configurations of the RF601 barcode scanner contains an integrated Class II laser product. Direct eye contact with the laser beam or with a reflected beam from a shiny surface may cause permanent damage to the eyes. To avoid risks, please make sure that never look directly to the laser and/or point anybody with the device.

Medical equipment compatibility

Medical devices, such as pacemakers, hearing aids etc. are usually manufactured according to the IEC 601-1-2 standard, which requires that devices must operate properly in an EM (Electromagnetic) field which has a strength of 3V/m over a frequency band from 26 to 1000 MHz. The RF601 is transmitting at a frequency range of 433.60 to 434.20 MHz, however, all electric appliances may emit spurious RF-signals at other than specified frequencies.

WARNING: Persons using pacemakers should be aware of the possible risk of interference from any electronic device if positioned too close to the pacemaker.

EC Declaration on Conformity

Nordic ID hereby declares, that Nordic ID RF601 wireless data collection system has been tested according to the standards EN 300 200-1 and EN 301 489-3.

The equipment conforms to the essential requirements of the Directive 1999/5/EC.

Document history

March 2006	Draft1
May 2006	Release version

Warranty and safety warnings

Please read the following warranty and safety related warnings carefully before using the product.

Nordic ID RF601 is a radio device and should not be used in any environments where radio transmitting may cause any harm. Typical but not limited to are the following types of environments: environments with explosive materials, liquids or gases, demolition sites, hospitals and emergency care rooms, airplanes and areas with highly sensitive measurement instrumentation.

Users with pacemakers are to be instructed about the possible safety hazards posed by radio emitting devices. Placing any radio emitting device near to pacemakers is not recommended. Consult pacemaker documentation for further safety regulations and requirements set by manufacturer of the pacemaker in question.

NOTICE: Persons using pacemakers should be aware that RF-emissions from the RF601 may cause unwanted interference if positioned too close to the pacemaker.

NOTICE: RF601 has not been designed, intended nor inspected to be used in any life support related device or system related function nor as a part of any other critical system and are granted no functional warranty if they are used in any such applications.

The use of any radio emitting device in explosive environments and especially near explosives may pose serious threats.

RF601 models contain a laser barcode reader device. Users are advised to follow general safety procedures relating to the use of laser devices.

Nordic ID RF601 should not be used in critical systems where continuous operation is required and where the possible loss of data or unwanted changes to data contents are not acceptable, such as in life support related systems.

Warranty will be void, if the product is used in any way which is in contradiction with the instructions given in this User Manual, or if the housing of the RF601 has been opened or tampered with.

The devices mentioned in this manual are to be used only according to the instructions described in this manual. Faultless and safe operation of the devices can be guaranteed only if the transport, storage, operation and handling of the devices are appropriate. This also applies to the maintenance of the products.

RF601 contains no user serviceable parts inside the actual case apart from the batteries, which may be replaced if required.

NOTICE: Use only AA-type alkaline batteries or rechargeable batteries type: GB Batteries, Models GP180AAHC, GP210AAHC and GP230AAHC (GPI International). Do not mix batteries (do not use simultaneously batteries of different capacity, brand, age or type). Observe correct polarity indicated on the label inside the battery compartment. Do not attempt to charge alkaline or other non-rechargeable battery types using the Hand Terminal and the Desk Top Charger or any other charger. When charging batteries inside the terminal use ONLY charger provided by Nordic ID.

NOTICE: With use of Desk Top Charger and Base Station use only applicable power supplies: JODEN ELECTRON Co., Ltd, Models: JOD-4101-031, JOD-41B-029, JOD-41U-14A.

WARNING: The batteries must be discarded according to local environmental laws and regulations. The batteries may contain harmful, dangerous or lethal substances, and may cause injury or loss of life if handled recklessly. Never dispose the batteries in fire due to a risk of explosion.

Any repair of the RF601 must be done by an authorized service partner of Nordic ID.

WARNING: The RF601 Hand Terminal and Desk Top Charger and power supply contain no user serviceable parts. Opening the cases will void warranty and may cause injury. The Hand Terminal contains batteries, which may be changed by opening the battery cover.

In some configurations the RF601 contains a Class II laser device which may cause eye injury if the beam is directed straight or via a shining surface to the eye. The laser beam should never be pointed at the eye or eyes of persons or animals. Note that mirrors and reflecting surfaces may cause the beam to deflect in harmful ways. Never look directly into the laser module when the beam is active.

In Accordance with
EN 60825-1 / A2:2001
(IEC 60825-1 Ed.1.2,2001-08)
650 nm laser
max. 1 mW output

ENGLISH
LASER LIGHT
DO NOT STARE INTO BEAM
CLASS 2 LASER

SUOMI
VAARA LASERSATEILYÄ
ÄLÄ TUIJOTA SÄTEESEEN
LUOKKA 2 LASER

DEUTSCH
LASERSTRAHLEN
NICHT DIREKT IN DEN LASERSTRAHL SCHAUEN
KLASS 2 LASER

SVENSKA
VARNING LASERSTÅLNING
STIRRA EJ IN I STRÅLEN LASERPRODUKT DER KLASSE 2

DANSK
LASERLYF
SE IKKE IND I STRÅLEN
KLASSE 2 LASER

ITALIANO
LUCE LASER
NON FISSARE IL RAGGIO PRODOTTO
AL LASER DI CLASSE 2

FRANÇAIS
LUMIERE LASER
NE PAS REGARDER LE RAYON FIXEMENT
PRODUIT LASER DE CLASSE 2

ESPAÑOL
LUZ LASER
NO MIRE FIJAMENTE EL HAZ
PRODUCTO LASER DE LA CLASE 2

NEDERLANDS
LASERLICHT
NIET IN STRAAL STAREN LASERLYS
KLASSE-2 LASER

NORSK
IKKE STIRR INN I LYSSTRÅL

LASER, KLASSE 2

PORTUGUÊS
LUZ DE LASER NÃO FIXAR O RAIO LUMINOSO
PRODUTO LASER DA CLASSE 2

1. Using the RF601 for the first time

1.1   Unpacking the unit

The RF601 Hand Held Unit packing includes:

•   RF601 Hand Held Unit
•   Nordic ID User Manual CD and/or book
•   Rechargeable batteries (optional)

The Demo-packing includes also:

•   Base Station
•   2m Cable between Base Station and Serial port)
•   Desk Top charger DTC05
•   Configuration cable (831)

Remove the unit from the packing and check that all above is included. Save the packing for possible future purposes.

1.2   Installing batteries

Before using the RF601 install 2 AA-sized alkaline or fully charged rechargeable batteries as shown in the figure 1.

Fig. Installing batteries to the RF601

1.3 The keyboard

RF601 has 22 button keyboard; scan-key, 5 programmable function keys F1-F5, OK, shift and Up-Down movement –key, 12 alpha/numeric keys and a DEL-key.

Scan -key

OK -key

Programmable function keys

Alpha / numeric -keys

Del -key

Shift -key

Programmable function keys

Up / Down movement -key / charging led
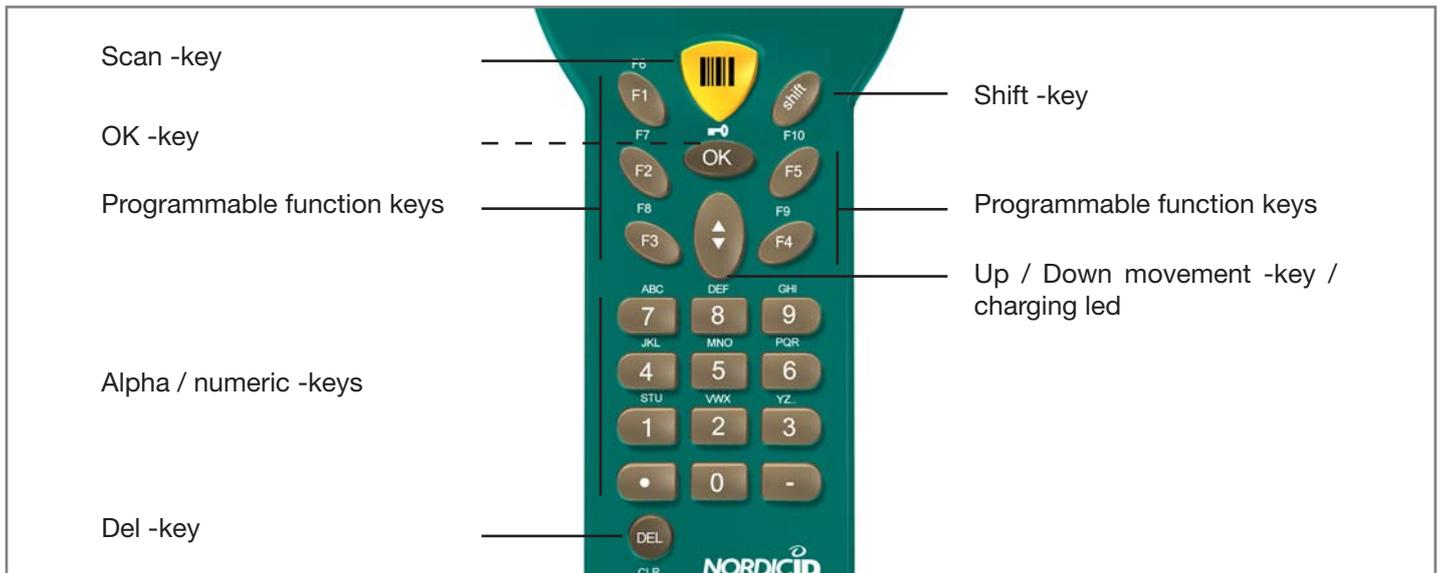
Fig. Keyboard of the RF601

1.4 Activating the device

The Hand Terminal has no On/Off switch. The Hand Terminal is always (when batteries are powered) ready to function by pressing any key. When resetting (SHIFT+DEL) or installing batteries the Hand Terminal beeps twice. The Hand Terminal will resume its standby state 30 seconds (default, configurable to max 254 seconds) after the last function.

1.5 Splash screen and initial display

A splash screen is a displayed immediately after the batteries are installed. This screen is fully configurable to display any characters on the keymaps.

An initial display will always appear if no fields are defined. This will usually occur when the Hand Terminal is activated or its RAM is cleared. The initial display includes a heading which can be defined by the user and an input field of max. 18 characters.
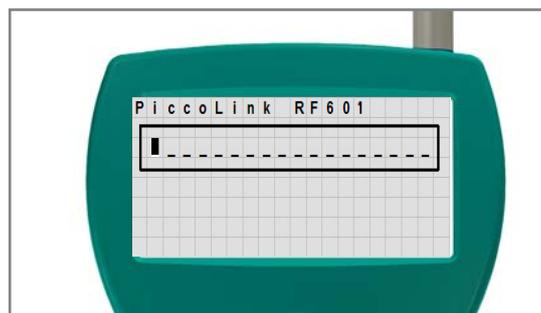
Fig. Intial display of the device

2. System

2.1 System overview

The Nordic ID RF601 Wireless Data Collection System consists of three principal components:

- Nordic ID RF601 Hand Terminal(s)

- Nordic ID RF601 Base Station(s)

- The application software that runs on the Host Computer

This picture (figure 4) illustrates how a Nordic ID RF601 operates. The information will be sent from the handheld terminal via the base station to the host application. In some configurations the base station includes an ethernet connector which can be used to connect the base station to the host computer via LAN network.

2.2 Principles of Operation

The Nordic ID RF601 is a Hand Terminal which communicates wireless with PC application software via Nordic ID RF600 Base Station(s). A Base Station can be connected directly to the Host Computer using an RS232C interface, or via network by using the Ethernet connector (optional feature). The Hand Terminals can send/receive data to/from the Host Computer using the specific Communication protocol. Data transfer between the system components is always check summed and acknowledged. This prevents any loss of data.

2.3 Communication between the Base Station and the Host Computer

The Base Station keeps listening the radio channel and the RS232C interface this is in order to check if the Hand Terminals or the Host Computer have data to send. When the base Station receives data from the Hand Terminal, it verifies the integrity of the data frame by using CRC check summing; only correct messages are then passed to the RS232C port. The CRC is not removed from the message so that it can be used to check the hardware link between the Base Station and the Host Computer.

When the Base Station receives a data from the Host Computer, the CRC checksum is recalculated for the data frame. Only if the message is correct will it be transmitted to the radio channel.
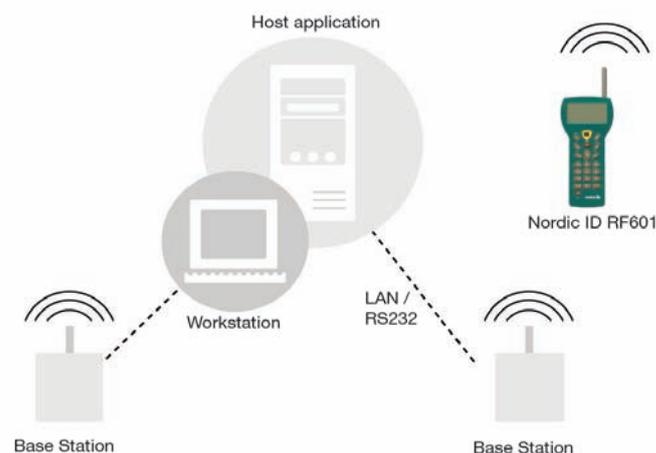
Fig. Diagram of the communication

2.4   Operation of the Hand terminal

The RF601 Hand Terminal is designed to use application specific forms, so called fields in the virtual display. This helps to make the user interface of the Hand Terminal flexible and easy-to-use. The commands in use to generate, modify, read and write the forms are described in the document called "RF-series system developers guide".

When no forms are used, the initial screen of the Hand Terminal prompts an initial display and an input field. This field can be filled with data from the keyboard or from a scanner. Any text sent by the Host Computer will clear the screen and show the text that was sent. Any user input (from the keyboard or laser scanner) will clear the text and the initial screen will be displayed again.

The user starts a transaction by making the entry using the Hand Terminal keyboard or reading a barcode. Then the Hand Terminal sends this data to the Host Computer (via the Base Station) and waits for a message from the HOST. If it does not receive a correct (check summed) message within the specified time limit, it will resend the original data as many times as it has been programmed to do.

Note: When no entry is made on the Hand Terminal by the user, the hand terminal remains in a standby state and will not be able to receive data from the Host Computer. There are some exceptions to this which will be described in the RF-series system developers guide.

2.5   Security

RF technology offers a good level of data transfer security. It is necessary that no external part without a proper authentication is able to access the network with capable device.

Security implementation on the Nordic ID RF601 system is based on three factors

> • User authentication

User has to identify him/herself. This may include a password and user name input screen defined by the Host Application and displayed as the first screen visible to the user trying to connect to the Host Application

> • Device authentication

To increase security of the Nordic ID RF600 system, the host application will handle only those hand terminals which serial number match with the specific list of hand terminals provided by the host application.

The CommID of the Hand Terminal can be used to distinguish between an allowed and rejected Hand Terminal used in the RF601 network.

> • Radio link encryption

By default, the radio link between the RF601 hand terminal and the base station is not secured. Messages sent by the hand terminal can be read with the base station, which is operating in same channel. Data from the hand terminal input fields can be read with any terminal program (ex. hyper terminal).
A Message from the HOST to the hand terminal is secured because the base station cannot read another base station messages.

In cases where encryption is specially needed, can user authorization be used for accessing to the computer system. Password and user ID information must be secured by encryption.

3. Setting up an example system

The example system can be created quite easily with demos available from our website. Download and install RF6xxDemoPack.exe which is the installation packet of four host demo application for the RF6xx hand held devices.

3.1 Fast Inventory -demo

This is detailed description how to use hand terminal set with the Fast Inventory demo application. The Fast Inventory is a simple application for collecting data to the specific text file using the RF-series hand terminal.

Equipment needed:

- RF601 hand terminal
- RF601 Base station + Power supply + serial cable
- PC with Windows operating system and serial port (COM)

1. Download and install RF6xxDemoPack.exe to your computer.
2. Connect the serial cable between the PC COM port and the Base station. You need to know COM port number.
3. Plug power supply to the base station. (Green Rx led will be lit)
4. Open Fast Inventory -program from the PC start menu: <START>->Programs->RF6xxDemoPack->Fast Inventory
5. Select correct COM port number from Fast Inventory program "Serial Connection" and press "StartServer" button to start the application.
6. If successful COM connection, COMx (where the x is the number of COM port) text appears in below the "Nordic ID RF6xx Driver Control " text.
7. If text is "CreateFileError", the COM port might be already used by another program.
8. Put fresh batteries to the hand terminal and press OK or any F-key for transmitting.
9. Fast Inventory application answers by displaying user interface screen on hand terminal.
10. Start using Fast Inventory Application by scanning a barcode. The program will save it to Inventory file, located at path displayed at Inventory file box.

If terminal does not communicate with the host program:

- Make sure that the hand terminal and the base station are in the same channel. (Factory default is 3)
- Make sure that COM port number is correct. (may vary depending on computer)

When the hand terminal connects first time to the Fast Inventory program, following screen appears to the hand terminal screen:
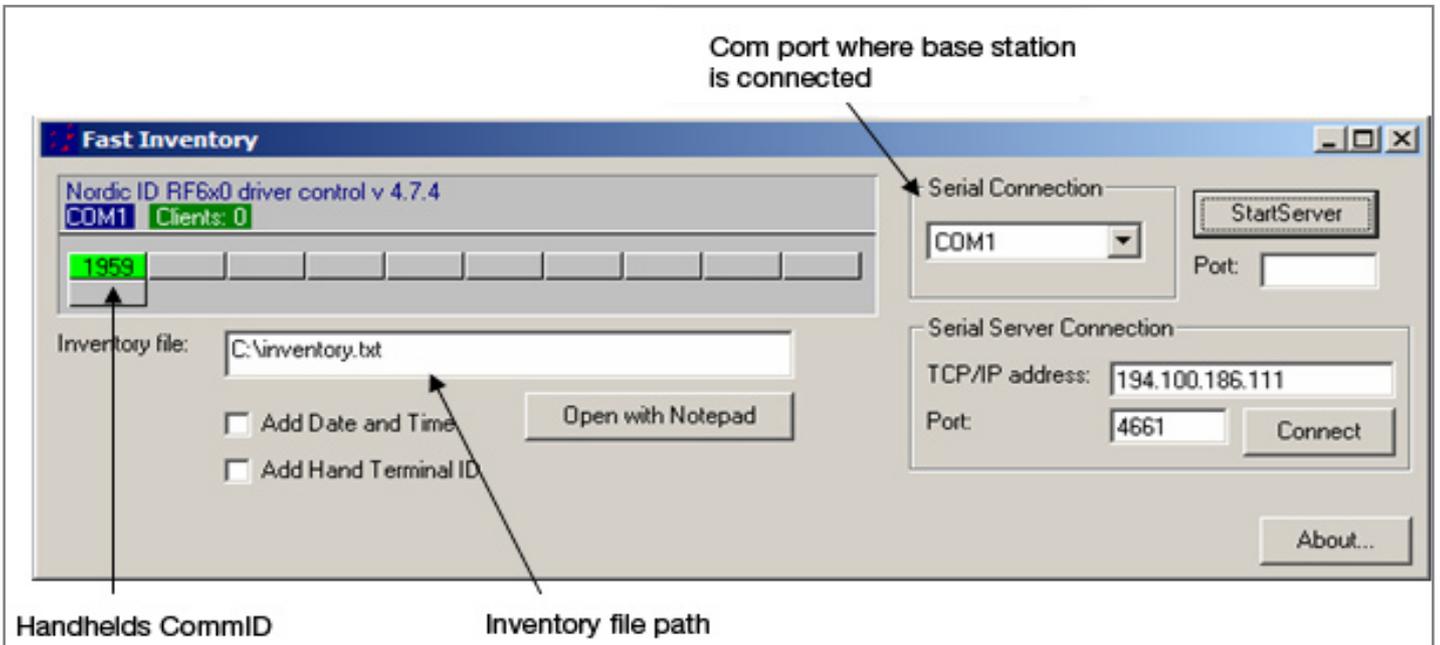
Fig. Fast Inventory -demo

The hand terminal user can type a count and scan a code of product: After scanning the code with the hand terminal, data will be transmitted to the host and saved to the specific Inventory file.
Fields are separated by semicolon (;): (code ; count ; date ; hand terminal ID)

f. ex: 023942874102;15;20.9.2004 9:07:55; 1959

The RF6xx Demo applications have several methods for connecting the base stations to the sample application.

- COM port: The most simple way is to connect RF601 base station directly to the demo application by using a PC COM port. Serial connection can be opened from the demo application by using the "Serial Connection" combo box:

- TCP/IP server: The base stations can be physically installed to the other computer or network server. The demo application can "listen" remote base station connections by activating "Start Server" and listening specific port for incoming connections.

- Serial Server Connection: If the base stations are connected to the LAN by using serial to TCP/IP converters, then the user can use "Serial Server Connection" for creating connection to the base station. User has to know the TCP/IP address and the port number of the serial server.

4.   RF601 Hand Terminal

4.1   Activating the device

The Hand Terminal has no On/Off switch. After installing batteries Hand Terminal is always ready to function by pressing any key. When resetting (SHIFT+DEL) or installing batteries the Hand Terminal will beep twice. The Hand Terminal will resume its standby state 30 seconds after the last function and it remembers its last state.

4.2   Display symbols and status messages

Special symbols will be shown on the right side of the display depending on the function:

SHIFTLOCK. This function will be ON or OFF by pressing the shift key,.

TRANSACTION. This sign shows up, when the Hand Terminal is communicating with the HOST.

TRANSACTION FAILURE. This sign shows up, when transaction between the Hand Terminal and the HOST has failed. This will also be indicated by four beeps.

LASER. This sign shows up, when the laser reader is activated. (yellow laser button)

The status messages are displayed at the bottom of the display. These messages contain information about and the device and its state. These messages are recognised by the black backround of the text.

4.3   Sounds

Resetting Hand terminal	2 beeps.
Transaction failure	4 beeps
Bad battery condition	3 beeps with different levels
Reception of message	At least 1 beep, can be more.
Successful reading of laser scanner	1 beep
Opening keylock	1 long beep
Wrong password	3 fast beeps

4.4 Key function table

Key	Function with shift key (shift + key pressed at the same time).	Function with SHIFTLOCK	Normal function
Laser	***	External reader or RFID reader activation, if available.	The Laser reader will be activated if allowed by the current input field.
F1	RECEIVER mode ON/ OFF	F6	F1
F2	***	F7	F2
F3	***	F8	F3
F4	***	F9	F4
F5	***	F10	F5
OK	Keylock ON / OFF	Normal function	The cursor will be moved to the next field and/or the content of the field sent to the HOST if allowed by the current field
Arrow up	Scrolls display upward	Moves the cursor step by step to the left.	Displays the previous field of the form.
Arrow down	Scrolls display downward	Moves the cursor step by step to the right.	Displays the next field of the form.
Shift	***	SHIFTLOCK OFF	SHIFTLOCK ON
7	***	ABC abc	7
8	***	DEF def	8
9	***	GHI ghi	9
4	***	JKL jkl	4
5	***	MNO mno	5
6	***	PQR pqr	6
1	***	STU stu	1
2	***	VWX vwx	2
3	***	YZÅÄÖ yzåäö	3
.	***	↵ : ; ! ? " # & @ |	.
0	MENU	< > [ ] Ü { } ( ) ü	0
-	Backlight (option)	Spc + * / % = $ £ ± ½	-
DEL	Reset	Normal function	Removes a character from the current field.

Table: Key function table

NOTE: The characters depends on the keymap used.

4.5 F-Keys

The F-Keys <F1> - <F10> can be programmed with a special configuration program to include recurring strings.

The F-Keys function in two different ways:

- By pressing an F-key, the string of characters is sent to the Host Application. This is the default setting.

Example: When the user presses F1-key, the string "F1" will be sent to the Host Application.

- By pressing an F-Key, a string is printed in the current field. If the length of the string exceeds the length of the field, the excess characters will be omitted. If the field already contains text, it will be replaced by the new text.

A string of characters in the initial display can be sent to the HOST by pressing the OK button or read with a laser scanner.

5. Input fields

The Nordic ID RF601 Hand Terminal has a virtual display page of 12 x 20 characters. The actual display size is 8 x 20 characters, thus 2/3 of the virtual page can be viewed at a time. Rows may be scrolled by pressing the keys accordingly.

Depending on the Host Application, the Host Application can send fields to the Hand Terminal. These fields may be filled by using the keyboard or the laser scanner. Fields are underlined.

5.1 Locked fields (Buttons)

Fields can generally be filled with text using the keyboard. Locked fields are an exception to this rule. When a locked field is active, the text in the field is highlighted (black background with white text). The laser scanner cannot be used to fill a locked field. A locked field functions like a button and the contents of the field can be sent to the Host Application by pressing the <OK> key.

5.2 Filling fields with the scanner

It is possible to define input fields to have different behaviour when filling an input field with the laser scanner: Typically, the scanning result goes to the active input field (where the cursor is). Alternatively, if the form has an input field which is defined as a "DEFAULT_LASER" field, the scanning result is copied into that field regardless of whether it is active or not. If the field already contains text, it will be replaced by the new text.

1. A field can be filled using the laser scanner and be sent to the HOST immediately Example: typical stock taking situation.

2. A field can be filled using the laser scanner but not sent to the HOST.Example: the user needs to verify the text string contents before sending to the Host Application.

3. A field cannot be filled with a laser scanner. Example: the field requires the user to input other information, for example numbers.

5.3   Writing text in a field

An active field is indicated by the cursor. An active field can be filled with text by using the keyboard and/or by using the laser scanner.

You can move the cursor in the field step-by-step by using the keys if SHIFTLOCK-function is ON (the symbol will be visible in the right lower part of the display).

5.4   Writing letters

Letters can be written into a field when the SHIFTLOCK is ON (the symbol will be visible in the lower right part of the display) by pressing the proper number keys (the letters are also printed into the keys). When a key is pressed once the first printed letter on the key will be generated. When pressed quickly twice the second letter printed on the key will be generated etc.

Pressing a key for at least 1.2 seconds will change the letter from uppercase to lowercase and vice versa.

5.5   Removing letters

Letters can be removed from a field with the <DEL> key.
Pressing the <DEL> key for at least 0.5 seconds clears the entire field of any text.

5.6   Moving between fields

You can move between the fields by using the <> keys. By pressing the <OK> key, you can move to the next field.

5.7   Locking the keyboard

The keyboard may be locked by pressing the <SHIFT> key and while keeping it pressed by pressing the OK-key (second function of the <OK> button).

6.   Built-in Menu

The settings of the Hand Terminal can be changed through the Menu. The Menu can be activated only if the initial display is on by pressing the keys SHIFT + 0.

You can move in the Menu by using the <> keys. The desired item is selected by pressing the <OK> key. You can move backwards in the Menu by selecting the << choice and pressing <OK>.

For changing existing settings values, delete previous value using the <DEL> button. Type in the new value and press <OK>.

After choosing an item in the Menu, confirm the selection by pressing the <OK> key. Changed setting will be signalled by a beep.

6.1   Settings

Settings-menu contains functionalities for managing RF-connections. After selecting Settings from the Main Menu, a 4-digit password is required. Usually only a representative of the system integrator has access to these settings. By default the password is 0000, entering that and pressing <OK> will open Settings menu.

6.1.1 RF-settings

Channel

> In this menu user can choose communication channel from 1 to 7. Note that the channel must be same in the HOST-computer.

Resending times

> How many times a message is sent to the HOST if no answer is received. If the Hand Terminal cannot get a response from the Base Station, and all the resending times have been used, the transaction failure sign F will be prompt on the display.

Reception timelimit

> The time limit during which the Base Station must respond to the Hand Terminal before the message is resent. Timelimit can be chosen between 1 – 15 seconds.

"WHAT" Behaviour

> In this menu user can choose "WHAT" command behaviour between 2 types: the New and the Old one. The difference between these is explained in RF6XX System Integrator Guide. The default is 0 (new style).

6.2   Adjustments

This menu contain general settings of the Hand Terminal

Contrast	Display contrast (0 - 100%)
Key sounds	0=Off / 1=On
Volume	Beeper level and frequency.
Battery type	0, if NI-CD or NI-MH rechargeable batteries are used. 1, if using normal batteries.

6.3   Info

This screen shows some basic info about the RF601.

Header	Device and Firmware version
commID	The communication identification number of the device
Charmap	Active charactermap in use
Battery	Battery charge level indicator

6.4 Laser conf.

The user can fill this input field by activating the scanner and by using the scanner to read a barcode.

This feature may be used to test the reader functionality and programming the laser module. A special use of this feature relates to the programming of the laser module with the help of special programming barcodes provided Nordic ID. For further information about programming the laser module, please contact Nordic ID Technical Support (support@nordicid.com).

The scanner can also be configured "on-line" from the backend software. This feature is explained in the document "RF-series system developer guide".

7. RF601 Base Station

RF601 Base Station creates the radio network required for the data transmission between Hand Terminal(s) and Host system. Base station supports 7 channels which each can support several users simultaneously. The base station can be connected to the host system using an RS232 serial interface or to LAN (Local Area Network) using the Ethernet connector (optional).

The Base Station has an RS232C port with fixed settings 19200 bauds, no parity, 8 data bits, and 1 stop bit. It uses RTS/CTS hardware handshaking in the direction HOST-> Base station.

The configuration of the (optional) ethernet connector is done by specific software avalable from Nordic ID.

Fig. The Nordic ID RF601 Base Station

8. Setting up a RF601 network

This chapter describes the basics of building the RF601 network. Detailed info can be found on document "RF6XX System integrator guide" available from Nordic ID Partner Login Area at www.nordicid.com.

8.1 Site Survey

Site survey is a Radio Network operation survey on an actual user environment. This means that Base Stations are placed to the desired positions at the site and then measurements are made to check how the connection signals changes. By doing this the base station(s) can be positioned to best possible places.

Enter the Site survey -mode by typing "TST" in the password field. The site survey shows all the RF601 Base Stations in the range, their CommID number and the RSSI (Radio Signal Strength Indicator) value. Bigger value means better signal strength.

8.2 Installation of the network

The network is build by using base stations that cover the area where Hand Terminals is being used. Base Stations must configure to work as a network with a specific configuration tool available from Nordic ID by request.

In theory the best place to install a Base Station is at middle of the area to be covered. However the frequencies used in RF601 system can be heavily attenuated by object between the Terminal and the Base Station.

The actual installation of Base Stations must be made by authorized personnel and followed by local legislation.

9. Using the scanner

User can read barcodes depending on configuration of the handheld unit. See Appendix for more info about scanner configuration.

1. Hold the RF601 at a slight angle about 10 – 30 cm (few inches) from the barcode label to be read. If the surface of the barcode label is very reflective, scanning from directly above (90° angle) may cause reading errors.

2. Push the <SCAN> button on the keypad while directing the beam so that the beam covers all of the bars on the label. A beep or audio signal will be generated indicating that the scanner has successfully read the label. The scanner will stay on or it will automatically turn off depending on the scanning options, During normal operation, the beam will be switched off immediately after the barcode has been read successfully.
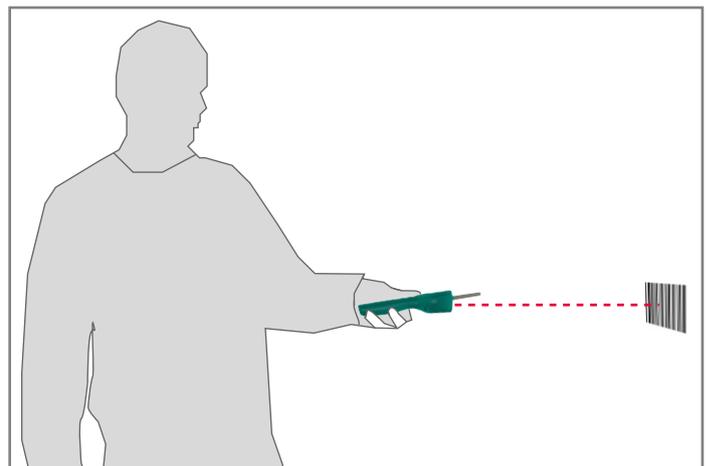
10. Labels

The labels are located backside of Hand Terminal and inside the battery compartment.

The labels inside the battery compartment may be read by removing the battery compartment cover and the batteries. The label also contains markings to indicate the correct orientation and polarity of the batteries or re-chargeable batteries.

Label includes the following information:

- Type of the Hand Terminal
- Serial number of the Hand Terminal
- CommID (a communications identification number, which can be used by the Host Application to identify a particular Hand Terminal)
- The configuration code of the hand terminal

Fig: Type label of the RF601 hand terminal

Please note that there might be several types of Hand Terminals with different configuration. For further details please contact Nordic ID or your local reseller.

The CommID (Communication ID) is a fixed number, which is used to identify transmissions. In RF600 system this number was the same as the serial number of the device. CommID range is between 0 and 65535.

The laser light caution label is located backside of the hand terminal.

11. Desk Top Charger (DTC05)

The RF601 Hand Terminal may be powered either by using alkaline batteries (AA-type 1.5V batteries) or by using NiMH-type AA-size rechargeable batteries. Note that the only approved type of rechargeable batteries is: GB Batteries (GPI International) Model: GP180AAHC.

When using NiMH-type batteries an optional Desk Top Charger is available. The information in this chapter applies to the single Hand Terminal Desk Top Charger (DTC05) but applies also basically to the Multiple Desk Top Charger unit, with which it is possible to charge up to five Hand Terminals simultaneously.

11.1 General information

The Desk Top Charger is used for charging the rechargeable batteries of the Nordic ID RF601 Hand Terminal. It is a fast charger which reduces the charging time. Using the Desk Top Charger the batteries may be charged without removing them from the Hand Terminal. The charging procedure is directed through the Hand Terminal.

11.2 Equipment needed for using the charger

- Desk Top Charger
- Power Supply (see approved models at the chapter "Warranty and safety information" at page 3 of this manual)
- Approved type of AA-size rechargeable batteries
- Nordic ID RF601 Hand Terminal

11.3 Connectors

The only connector of the charger is for the power supply.

Fig. The power connector of the charger

11.4 Indicators

The charging indicator, which shows the charging status of the batteries is located in the up/down -key of the hand terminal. The hand terminal indicates the charging For more information see section: 11.7 Audible signals and the LED indicator on the hand terminal

11.5   Charging the batteries

WARNING!

Do not attempt to charge regular or alkaline batteries as this may cause an explosion.
Do not place a defective Hand Terminal into the charger.
Use only approved type of rechargeable batteries.

NOTICE! Use only approved type of power supplies (see chapter "Warranty and safety warnings" at page 3 of this manual).

The Hand Terminal cannot be used during battery charging. It is normal for the base of the charger to become warm during charging.

Fig. The Nordic ID RF601 and the charger

Requirements for using the Desk Top Charger:

- Batteries must be placed inside the Hand Terminal to allow charging.
- Check that the Hand Terminal batteries are of rechargeable type (NiMH).
- Check that the settings for the Hand Terminal have been configured as follows:

    MENU > ADJUSTMENTS > BATTERY > 0. (See User Manual: MENU).

- Connect the power supply adapter (9525) to the power supply connector of the charger (see picture).
- Place the Hand Terminal in the charger.
- The Hand Terminal will beep and start to charger the batteries in full charge mode.
- If the rechargeable batteries are already fully loaded, the charger goes into trickle mode automatically.
- The charging indicator LED will remain ON during quick charging.
- The LED will start to blink when the battery is fully charged. The charger will switch over to trickle charge mode.

11.6   "Charging Failure" message

When placing the Hand Terminal into the charger, the Hand Terminal will check the functionality of the charger. If the Hand Terminal notices that the charging procedure cannot be started normally, a "Charging Failure" message appears to the display along with three successive beeps. In this case, remove the Hand Terminal from the charger immediately and check the batteries (should be of rechargeable type and approved manufacturer and capacity rating and installed observing the correct polarity marked on the Hand Terminal label inside the battery compartment) and then try again. If "Charging failure" message appears every time when placing the Hand Terminal into the charger, it is possible that the Desk Top Charger does not work properly.

It is also possible that the Hand Terminal causes the "Charging Failure" message.

11.7 Audible signals and the LED indicator on the hand terminal

The status of the Desk Top Charger charging process is indicated by the LED indicator located on the front side of the Hand Terminal base and by audio signals generated by the Hand Terminal.

CHARGING INDICATOR LED

Quick charge – the red LED remains on and batteries are charged with full charging current

Trickle charge - the red LED blinks and trickle charger mode will maintain the charge level of the batteries at full level.

AUDIBLE SIGNALS

Three successive beeps - charging not allowed (the Hand Terminal does not contain rechargeable type batteries.

Two successive beeps (long beep followed by short beep) - The battery is being charged.

NOTICE! TO AVOID DAMAGE OR ACCIDENTS, THE DESK TOP CHARGER MUST NOT BE USED FOR ANY OTHER PURPOSE THAN THAT STATED IN THIS MANUAL.

USE FOR OTHER PURPOSES NOT STATED IN THIS USER MANUAL MAY VOID WARRANTY.

11.8 Technical data

Rechargeable batteries	Size AA, (see chapter "Warranty and safety warnings" at page 3 of this manual)
Charging methods	Quick charge and trickle
Charging current	800 mA
Charging time	Ca 1,5 h (1800 mAh battery)

12. Troubleshooting

In case of problems encountered during the use of the RF601, please contact your system integrator or your local Nordic ID dealer.

The following Guidelines are to be followed when optimal working distance needs to be determined or if barcode decoding related problem is encountered.

NOTE: Due to the large variety of symbol sizes, densities, print quality, etc., there is no simple formula to calculate the optimum symbol distance.

1. Measure the maximum and minimum distance at which your symbols can be read.
2. Locate the scan engine so that the symbol is near the middle of this range when being scanned.
3. Check the near and far range on several symbols. If they are not reasonably consistent there may be a printing quality problem that can degrade the performance of your system.
4. Center the symbol (left to right) in the scan line whenever possible.
5. Position the symbol so that the scan line is as near as possible to perpendicular to the bars and spaces in the symbol.
6. Avoid specular reflection (glare) off the symbol by tilting the top or bottom of the symbol away from the engine. The exact angle is not critical but should be large enough to allow the reflected scan line to miss the window of the laser engine.
7. Check that the window is clean.
8. Give the scan engine time to dwell on the symbol for several scans. Poor quality symbols may not read on the first scan. When first enabled, the scan engine may take two or three scans before it reaches maximum performance. Enable the scan engine before the symbol is presented, if possible.

13. Maintenance

The RF601 display window and the laser scanner window may be cleaned with a clean, non-abrasive, lint-free cloth. Under no circumstance use alcohol or detergents, as these may harm the materials of the casing and/or remove markings.

14. Removing device from the use

When removing the device from use in EU area, the device must be returned to local Nordic ID office or to Nordic ID service center. Please see www.nordicid.com or your supplier to find nearest Nordic ID office or Service center. Returning the device to Nordic ID enables reuse of the materials in the device. If the device is left to nature hazardous substances in the equipment may have effects on environment and human health.

Wasted Nordic ID RF601 handheld and accessories must be collected separately.

15.   Warranty, support and service information

If you encounter problems during the use of the Nordic ID RF601, please contact your system integrator or local Nordic ID dealer.

15.1   Warranty coverage

Nordic ID grants warranty to its products according to Nordic ID General Sales Conditions.

Only service companies authorized by Nordic ID have the qualified service maintenance facilities and know-how for the servicing of RF601.

NOTE: Service attempts by unauthorized personnel will void warranty.

15.2   Returning the unit for service

The Product shall be returned to the Manufacturer for repair in case the System Integrator or the local Nordic ID dealer cannot help with the problem. Each party will bear the cost of freight of the Product to be repaired to the intended destination.
Please include a detailed description of the problem encountered and a copy of the original purchase order / receipt together with full return address and contact information (name of the sender, contact phone number, email address) with the shipment and send it to authorized service location.

15.3   Extending the normal warranty

Repair service done by the Manufacturer after the warranty period will be charged according to the valid service price list. The repair service is valid for five years after shipping the Product to the System Integrator or the local Nordic ID dealer.

Upon request the Manufacturer may extend the normal warranty period. This must be requested using a separate quotation request addressed and sent to the System Integrator or local Nordic ID dealer.

16. Application development

The Nordic ID RF601 data collection system interface for 32-bit Windows environment is easy by using the ActiveX technology. PLServer is ActiveX software component for communication between the hand terminal and the Host application.

Tools for the RF601 software development is available by request. To register and order the tools package please contact Nordic ID by email using the address info@nordicid.com or via your sales contact.

16.1 Software tools and documents

Software tools and documents available from Nordic ID contains demo applications and some configuration software applications required e.g. if updating the firmware of the RF601.

Tools and documents include:

- RF601 User Manual (this document)
- CD-ROM contains the following software
  - Various demo software
  - Configuration software
  - Programming examples (code examples)
  - Nordic ID Port Router
- Desk Top Charger with power supply and mains cable (EU, UK or US version)
- Configuration cable
- Boot cable

16.2 PLServer, PiccoLink driver ActiveX control

The Nordic ID RF601 driver control is a 32-bit Windows ActiveX control (PLServer.ocx), which controls the data communication between the base station and the HOST application.
PLServer makes HOST system software development easy because it does all the dirty work for you. The use of PLServer provides a lot of functionality and code that you don't have to write or debug. All you have to do is to figure out the entry points and how to use them.

You can use PLServer control in applications that are developed with Visual Basic, Visual C++, .NET, Excel, Access, FoxPro, Delphi and many more products that support ActiveX controls.

17.   Accessories

- Holster with Belt Clip (574)
- Full Cover Holster (575)
- Shock Absorbing Cover in 3 colors; grey, turquoise and orange
- Multiple Desk Top Charger
- Cable Kit (900) which includes:
    - 2 pcs BS-extension cable with RS-11 connectors 10m (920)
    - BS extension socket with DC-cable (925)
    - BS extension socket (927)

Cables can be also sold separately. Ask your local Nordic ID dealer or mail to support@nordicid.com.

18. Technical Support

The System Integrator or your local Nordic ID dealer or primarily provides all non-service related technical support. Nordic ID as a hardware manufacturer provides the hardware repair related technical support.

Please use the e-mail address below when technical support is required:

Nordic ID Head Office
Myllojankatu 2A
FIN-24100 SALO
FINLAND

Telephone   +358 – 2 – 727 7700
Fax   +358 – 2 – 727 7720

Technical Support
Telephone   +358 – 2 – 727 7736 direct
Fax   +358 – 2 – 727 7720

support@nordicid.com (7 – 16 CET)

19.   Latest information

For latest information on RF601 and related products and on possible changes to this manual please consult our Web-pages at:

www.nordicid.com

APPENDIX A - Troubleshooting

In case of problems encountered during the use of the RF651, please contact your system integrator or your local Nordic ID dealer.

The following Guidelines are to be followed when optimal working distance needs to be determined or if barcode decoding related problem is encountered.

NOTE: Due to the large variety of symbol sizes, densities, print quality, etc., there is no simple formula to calculate the optimum symbol distance.

1. Measure the maximum and minimum distance at which your symbols can be read.
2. Locate the scan engine so that the symbol is near the middle of this range when being scanned.
3. Check the near and far range on several symbols. If they are not reasonably consistent there may be a printing quality problem that can degrade the performance of your system.
4. Center the symbol (left to right) in the scan line whenever possible.
5. Position the symbol so that the scan line is as near as possible to perpendicular to the bars and spaces in the symbol.
6. Avoid specular reflection (glare) off the symbol by tilting the top or bottom of the symbol away from the engine. The exact angle is not critical but should be large enough to allow the reflected scan line to miss the window of the laser engine.
7. Check that the window is clean.
8. Give the scan engine time to dwell on the symbol for several scans. Poor quality symbols may not read on the first scan. When first enabled, the scan engine may take two or three scans before it reaches maximum performance. Enable the scan engine before the symbol is presented, if possible.

Should you have some more questions or problems, please go to our website: www.nordicid.com. If you cannot find the answer for your problem there, please contact Technical Support by sending email to support@nordicid.com .

APPENDIX B - Introduction to the Laser Engine

A laser diode produces a single beam of coherent light which deflects off a mirror, and is emitted from the laser engine used inside the RF651. The total deflection of the single beam is 53° (standard version), and the scan frequency is 39 scans per second.

When the laser beam strikes a barcode, the dark bars absorb most of the light while the light spaces reflect most of it. Thus, changes in the reflected light can be used to deduce the barcode into electronic format. A photo diode is used to sense the reflected laser light and generate a current proportional to the reflected light signal. The current then produces an analogue voltage, which is further amplified, filtered to minimise noise related problems and then finally sent to a digitiser, which transforms the analogue signal into digital form representing the barcode. This is called the Digitised Bar Pattern (DBP).

The DBP data is then sent to the decoder board for processing into a host-compatible format and further applications are based on the software used.

The technical specifications of the laser engine used in the RF651 are listed in the table below.

Item	Description
Laser Power (at 650 nm)	
	Scan mode; 1.7 mW (± 0.2 mW)
	Aim mode: 0.5 mW (± 0.05 mW)
	CDRH Class II/IEC Class 2
Optical Resolution	
	0.004 in. minimum element width
Print Contrast	
	Minimum 25% absolute dark/light reflectance measured at 650 nm.
Scan Angle	
	Wide: 47° ± 3°
	Narrow: 35° ± 3°
Environmental characteristics	
Ambient light immunity:	Sunlight: 107,640 lux (10,000 ft. candles)
	Artificial Light 4,844 lux (450 ft. candles)
Scan rate	
	92 minimum., 104 typical, 116 max. scans/sec (bidirectional)
Scanning angles	
	scan angle: 47° ± 3° (wide), 35° ± 3° (narrow)
	skew: 100% UPC at 5 in. ± 50° from normal
	pitch: 100% UPC at 5 in. ± 65° from normal
	tilt: 100% UPC at 5 in. ± 35° from vertical
Reading distances	
	Near ranges on lower densities (not specified) are largely dependent upon the width of the bar code and the scan angle.

Table: Laser engine technical specifications

Usable scan distance depends on the barcode size and pitch, quality of the barcode print and ambient light conditions as well as the pitch and angle of the laser beam in reference to the barcode surface. Further information is available from Nordic ID Technical Support upon request (support@nordicid.com).

APPENDIX C - Introduction to the Linear Imager

The Linear imager is a high performance decoded bi-linear bar code scanner. The Linear imager uses Active Pixel Sensor (APS) CMOS technology. It combines high density, standard range and PDF 417 models all in one.

The linear imager has a very high scan rate and a large depth of field enabling it to read even the most elusive bar codes including poorly printed, damaged, low contrast, wide or high density.

The linear imager uses a 617nm illumination system to provide bright and sharp aiming line.

Light source	617 nm highly visible LED
Symbologies	
	Codabar, Codablock A and F, Code 11,
	Code 39, Code 93/93i, Code 128/ISBT 128/
	UCC EAN 128, Industrial and Standard
	2 of 5, Interleaved 2 of 5, Matrix, MSI
	PDF417/MicroPDF417/MacroPDF417
	Plessey, RSS, Telepen
	UPC/EAN/ISBN
	emulated DBP mode Codabar, Code 11, Code 39
	Code 93/93i
	Code 128/UCC EAN 128, Standard 2 of 5
	Interleaved 2 of 5, Matrix, MSI
	PDF417/MacroPDF417 (unbuffered mode)
	Plessey, RSS, Telepen, UPC/EAN
Environmental characteristics	
	ambient light works in any lighting conditions from 0 to 100 000 lux
Scan rate	
	decoded operation up to 500 scans per second (auto-adaptive)
Scanning angles	
	scan angle 40°
	skew 65°
	pitch 75°
	tilt 25° (N/A on stacked codes)
Barcode characteristics	
	min X dimension down to 0.1 mm / 4 mil
	barcode width up to 18 cm / 7 in on 0.3 / 12 mil resolution
	code print contrast down to 25%
Reading distance	
	0 to 49.2 cm / 19.4 in

Table: Linear engine technical specifications

APPENDIX D - Factory default settings of the scan engines

The scan engine used in the RF601 is programmed during the manufacturing process by defining certain operational parameters with default values. These values may be changed by special programming barcodes (detailed information available upon request from Nordic ID Technical Support).

The barcodes after the default settings can be used to set scan engine settings to default.

Laser engine default parameters

Parameter	Parameter Number (Hex)	Factory Default
Set Factory Default		All Defaults
Beeper Volume	0x8C	Medium
Beeper Tone	0x91	Medium Frequency
Beeper Frequency Adjustment	0xF0 0x91	2500 Hz
Laser On Time	0x88	3.0 sec
Aim Duration	0xED	0.0 sec
Scan Angle	0xBF	Wide (47°)
Power Mode	0x80	Low Power
Trigger Mode	0x8A	Level
Time-out Between Same Symbol	0x89	1.0 sec
Beep After Good Decode	0x38	Enable
Transmit "No Read" Message	0x5E	Disable
Parameter Scanning	0xEC	Enable
Linear Code Type Security Levels	0x4E	1
Bi-directional Redundancy	0x43	Disable
UPC/EAN		
UPC-A	0x01	Enable
UPC-E	0x02	Enable
UPC-E1	0x0C	Disable
EAN-8	0x04	Enable
EAN-13	0x03	Enable
Bookland EAN	0x53	Disable
Decode UPC/EAN Supplementals	0x10	Ignore
Decode UPC/EAN Supplemental Redundancy	0x50	7
Transmit UPC-A Check Digit	0x28	Enable
Transmit UPC-E Check Digit	0x29	Enable
Transmit UPC-E1 Check Digit	0x2A	Enable
UPC-A Preamble	0x22	System Character
UPC-E Preamble	0x23	System Character

UPC-E1 Preamble	0x24	System Character
Convert UPC-E to A	0x25	Disable
Convert UPC-E1 to A	0x26	Disable
EAN-8 Zero Extend	0x27	Disable
Convert EAN-8 to EAN-13 Type	0xE0	Type is EAN-13
UPC/EAN Security Level	0x4D	0
UCC Coupon Extended Code	0x55	Disable
Code 128		
Code-128	0x08	Enable
UCC/EAN-128	0x0E	Enable
ISBT 128	0x54	Enable
Code 39		
Code 39	0x00	Enable
Trioptic Code 39	0x0D	Disable
Convert Code 39 to Code 32	0x56	Disable
Code 32 Prefix	0xE7	Disable
Set Length(s) for Code 39	0x12 0x13	2-55
Code 39 Check Digit Verification	0x30	Disable
Transmit Code 39 Check Digit	0x2B	Disable
Code 39 Full ASCII Conversion	0x11	Disable
Code 93		
Code 93	0x09	Disable
Set Length(s) for Code 93	0x1A 0x1B	4-55
Code 11		
Code 11	0x0A	Disable
Set Lengths for Code 11	0x1C 0x1D	4 to 55
Code 11 Check Digit Verification	0x34	Disable
Transmit Code 11 Check Digit(s)	0x2F	Disable
Interleaved 2 of 5		
Interleaved 2 of 5	0x06	Enable
Set Length(s) for I 2 of 5	0x16 0x17	14
I 2 of 5 Check Digit Verification	0x31	Disable
Transmit I 2 of 5 Check Digit	0x2C	Disable
Convert I 2 of 5 to EAN 13	0x52	Disable
Discrete 2 of 5		
Discrete 2 of 5	0x05	Disable
Set Length(s) for D 2 of 5	0x14 0x15	12
Chinese 2 of 5		
Chinese 2 of 5	0xF0 0x98	Disable
Codabar		
Codabar	0x07	Disable

Set Lengths for Codabar	0x18 0x19	5-55
CLSI Editing	0x36	Disable
NOTIS Editing	0x37	Disable
MSI		
MSI	0x0B	Disable
Set Length(s) for MSI	0x1E 0x1F	6-55
MSI Check Digits	0x32	One
Transmit MSI Check Digit	0x2E	Disable
MSI Check Digit Algorithm	0x33	Mod 10/Mod 10
RSS		
RSS-14	0xF0 0x52	Disable
RSS-Limited	0xF0 0x53	Disable
RSS-Expanded	0xF0 0x54	Disable
Convert RSS to UPC/EAN	0xF0 0x8D	Disable
Data Options		
Transmit Code ID Character	0x2D	None
Prefix/Suffix Values Prefix Suffix 1 Suffix 2	0x69 0x68 0x6A	NULL LF CR
Scan Data Transmission Format	0xEB	Data as is
Serial Interface		
Baud Rate	0x9C	9600
Parity	0x9E	None
Software Handshaking	0x9F	Enable
Decode Data Packet Format	0xEE	Unpacketed
Host Serial Response Time-out	0x9B	2 sec
Stop Bit Select	0x9D	1
Intercharacter Delay	0x6E	0
Host Character Time-out	0xEF	200 msec
Event Reporting*		
Decode Event	0xF0 0x00	Disable
Boot Up Event	0xF0 0x02	Disable
Parameter Event	0xF0 0x03	Disable

Reset to default settings (se-955)

EV15 Linear Engine default settings

Function	FID	Default parameter
Codabar = 0x40		
activation	40	disabled
start stop transmission	58	disabled
CLSI library system	59	disabled
symbology identifier	C0	" B7 "
check digit verification	4C	disabled
check digit transmission	54	disabled
length L1	50	6
length L2	51	0
length L3	52	0
length mode	53	L1 as minimum length
Codablock = 0x4D		
Codablock A activation	40	disabled
Codablock F activation	41	disabled
Codablock A symbology identifier Codablock F symbology identifier	C0 C1	" K0 " " K1 "
Code 11 = 0x4A		
activation	40	disabled
symbology identifier	C0	" C1 "
check digit verification	4C	1 digit
check digit transmission	54	enabled
length L1	50	0 (any length)
length L2	51	0
length L3	52	0
length mode	53	L1 as minimum length
Code 39 = 0x42		
activation	40	enabled
full ASCII conversion	5A	disabled
reading range start stop transmission	47 58	extended " * " only
accepted start character	59	" * "
symbology identifier	C0	" B1 "
check digit verification	4C	disabled
check digit transmission	54	disabled
reading tolerance	4F	high
length L1	50	0 (any length)
length L2	51	0
length L3	52	0
length mode	53	L1 as minimum length

Code 93 = 0x41		
activation	40	disabled
symbology identifier	C0	" B6 "
length L1	50	1
length L2	51	0
length L3	52	0
length mode	53	L1 as minimum length
Code 128 / EAN 128 = 0x43		
Code 128 activation	40	enabled
Code EAN 128	42	enabled
EAN 128 identifier	58	enabled
GTIN compliant	60	disabled
FNC1 conversion	59	<GS> (1Dh)
ISBT 128	41	disabled
ISBT concatenation transmission	5A	disabled
concatenate any pair of ISBT codes	5B	disabled
reading range	47	extended
Code 128 symbology identifier	C0	" B3 "
EAN 128 symbology identifier	C1	" C9 "
reading tolerance	4F	high
check digit verification (French CIP)	4C	disabled
length L1	50	0 (any length)
length L2	51	0
length L3	52	0
length mode	53	L1 as minimum length
Interleaved 2 of 5 = 0x44		
activation	40	disabled
reading range	47	extended
symbology identifier	C0	" B2 "
check digit verification	4C	disabled
check digit transmission	54	disabled
length L1	50	6
length L2	51	0
length L3	52	0
length mode	53	L1 as minimum length
Matrix 2 of 5 = 0x45		
activation	40	disabled
symbology identifier	C0	" B4 "
length L1	50	6
length L2	51	0

length L3	52	0
length mode	53	L1 as minimum length
MSI Code = 0x46		
activation	40	disabled
symbology identifier	C0	" B8 "
check digit verification	4C	Modulo 10
check digit transmission	54	enabled
length L1	50	6
length L2	51	0
length L3	52	0
length mode	53	L1 as minimum length
PDF417 / MicroPDF417 = 0x4C		
PDF417 activation	40	enabled
control header	58	not transmitted
file name	59	not transmitted
segment time stamp sender	5A 5B 5C	not transmitted not transmitted not transmitted
Addressee	5D	not transmitted
file size	5E	not transmitted
checksum	5F	not transmitted
MicroPDF417 activation	42	disabled
MicroPDF417 Code 128 emulation	45	disabled
PDF417 symbology identifier MicroPDF417 symbology identifier	C0 C1	" C7 " " C8 "
Plessey Code = 0x47		
activation	40	disabled
symbology identifier	C0	" C2 "
check digit transmission	54	disabled
length L1	50	0 (any length)
length L2	51	0
length L3	52	0
length mode	53	L1 as minimum length
RSS = 0x4F		
RSS-14 activation	40	disabled
RSS Limited activation	41	disabled
RSS Expanded activation RSS-14 symbology identifier RSS Limited symbology identifier RSS Expanded symbology identifier	42 C0 C1 C2	disabled " C3 " " C4 " " C5 "

Standard 2 of 5 = 0x48		
activation	40	disabled
format	58	identicon (6 start/stop bars)
symbology identifier	C0	" B5 "
check digit verification	4C	disabled
check digit transmission	54	disabled
length L1	50	6
length L2	51	0
length L3	52	0
length mode	53	L1 as minimum length
Telepen = 0x49		
activation	40	disabled
format	58	ASCII
symbology identifier	C0	" C6 "
length L1	50	0 (any length)
length L2	51	0
length L3	52	0
length mode	53	L1 as minimum length
UPC / EAN = 0x4B		
activation UPC-A	40	enabled
activation UPC-E	41	enabled
activation UPC-E1	4C	disabled
activation EAN-8	42	enabled
activation EAN-13	43	enabled
ISBN conversion for EAN-13	44	disabled
add-on digits	5D	not required but
		transmitted if read
add-on 2	45	disabled
add-on 5	46	disabled
add-on 2/5 security	47	10 (0Ah)
check digit UPC-A transmitted	54	enabled
check digit UPC-E transmitted	55	enabled
check digit EAN-8 transmitted	56	enabled
check digit EAN-13 transmitted	57	enabled
UPC-A number system transmitted	58	enabled
UPC-E number system transmitted	59	enabled
GTIN compliant	60	disabled
UPC-A transmitted as EAN-13	5A	enabled
UPC-E transmitted as UPC-A	5B	disabled
EAN-8 transmitted as EAN-13	5C	disabled

reading range	4D	extended
UPC-A symbology identifier	C0	" A0 "
UPC-E symbology identifier	C1	" E0 "
EAN-8 symbology identifier	C2	" FF "
EAN-13 symbology identifier	C3	" F "
Decoding security = 0x71		
consecutive same read data validation	40	0
timeout between identical consecutive codes	80	300 ms
timeout between different consecutive codes	81	0 ms

Reset to default settings (EV-15)