RFID CONFIGURATOR INSTRUCTIONS





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1. INSTALLING NORDIC ID RFID CONFIGURATOR SOFTWARE

For configuring the NUR-05W module or Nordic ID Sampo S1 RFID reader install the latest Nordic ID RFID Configurator software. The newest release of the application is available for download in Nordic ID extranet pages at http://extranet.nordicid.com/

In case there is a previous version of the Nordic ID RFID Configurator software installed on the PC, it must be uninstalled prior to installing the newer one. The uninstallation can be done in Windows Remove programs and features utility.

The Nordic ID RFID Configurator installer packet will also install the USB driver for the Windows system. The user will be prompted during the installation with a pop-up window confirming the driver installation. Select 'install this driver anyway' to proceed with the driver installation (example picture from Windows 7).







2. STARTING THE APPLICATION FOR THE FIRST TIME

When the Nordic ID RFID Configurator is launched for the first time it will ask the user whether the application checks for updates online during the application startup. If enabled the Nordic ID RFID Configurator application will check and download the newest updated application installer locally to the computer. After this the user has to install the new application version manually.



The user can change the auto update setting later under 'About' window.







3. GENERAL TIPS FOR THE APPLICATION USE

All the configurable settings are divided into several segments. If you want to apply particular settings in the RFID reader, you need to check the box in the upper left corner of the corresponding segment. The actual RFID reader configuration is done under Configure the Device –segment by pressing the 'Configure Device' –button.

Note that some of the configurable settings that are shown to the user depend on the device which is connected. This manual describes the use of the application when Nordic ID Sampo is connected.





4. ESTABLISHING THE CONNECTION



After launching the Nordic ID RFID Configurator software the first thing to do is to establish the connection between the computer and the RFID reader. Press the 'Connection' button on the side bar and select the connection method. The connection can be established via USB, Serial or TCP/IP connection depending on the model of your the RFID reader.

IVSB auto connection Connected automatically to RFID reader via USB connection Manual connection USB USB Device: NUR Module (COM11) Image: Connection Serial Serial TCP/IP Host: 1270.0.1 Search Ethemet Port: 10000 Connection status Connected
Manual connection USB Evice: NUR Module (COM11) Serial Serial: TCP/IP Hot: Port: 10000 Search Ethemet Mode: SAMPO 51 Search Ethemet Disconnect Disconnect Disconnect Disconnect
USB Device: NUR Module (COM11) Image: Serial Intel(R) Active Management Technology - SOL TCP/IP Host: 127.0.0.1 Port: 10000 Image: Search Ethemet Connection status Search Ethemet Disconnect Disconnect
 Senial Senial: Intel(R) Active Management Technology - SOL ▼ TCP/IP Host: 127.0.0.1 Port: 10000 Search Ethemet Connection status Disconnect Disconnect
TCP/IP Host: 127.0.0.1 Port: 10000 Port: 100000 Port: 100000 Port: 100000 Port: 100000 Port: 100000 Port: 1000000 Port: 1000000 Port: 10000000 Port: 1000000 Port: 10000000 Port: 10000000 Port: 100000000 Port: 100000000 Port: 100000000 Port: 10000000
Connection status Connected Disconnect Disconnect
Connected Connected Disconnect Disconnect Cottle and outputs Connect
Connected Connected Disconnect Cothe profession for the profession
Disconnected Model: SAMPO S1 Serial: S00000XYZ Plisconnect Cat be and cate for a first the
Disconnect Serial: SU0000XY2 Disconnect At Serial: S01299 Firmware version: 3.1 A Hardware version: NOTSET
Disconnect Firmware version: 3.1 A Hardware version: NOTSET
Cat the seader seafer when the
Connection is established
Configure Ethemet settings
O DHCP O Static IP O Server O Client
Static IP 255.255.255 Listening port: 0
Subnet mask 255.255.255 Host IP 255.255.255

4.1. AUTOMATIC CONNECTION

USB auto connect: If the RFID reader is connected via the USB connection, 'USB auto connection' can be used for automatic connection. When the connection is successfully established, the picture of the RFID reader together with the model name, serial number and version details are shown in the information box.

4.2. MANUAL CONNECTION

USB: The user can manually select the USB connection. If there are multiple RFID readers connected to the PC, the user can select which one of them to use. After





selecting the RFID reader from the drop down list, press the 'Connect' button to establish the connection.

Serial: Connect the RFID reader with the serial cable and select the device from the drop down list. After this press the 'Connect' button

TCP/IP: In order to connect the RFID reader over a network, select TCP/IP. Then for the 'Host' enter the IP address of the RFID reader and the correct port number. Now press the 'Connect' button to establish the connection. Note that the RFID has to be in client mode in order to be able to connect it. You can also search the reader from the network by clicking 'Search Eth`-button. This will open a dialog Window (picture below).

Refres	h Conn	ect	Bee	ep						
Filter type						Filter ope	Filter data			
Vo filter										
Name	IP	Port	Add	Mo	Status	MA	۹C	Alt-S	Et	Ар
Wall	172.16.33.18	4333	DHCP	Client	Connec	cted 00	-21-ad-0a-00-12	5005	1015	3.1A
POS2	172.16.33.28	4333	DHCP	Client	Connec	cted 00	-21-ad-0a-00-07	5004	1015	3.1A
Window	172.16.33.20	4333	DHCP	Client	Connec	cted 00	-21-ad-0a-00-11	451190	1015	3.1A

Select the RFID Reader from the list you want to connect and press the 'Connect' – button.

When the connection is successfully established, the picture of the RFID reader together with the model name, serial number and version details are shown in the information box.





Configure Ethernet settings: When connected to a Nordic ID Sampo reader via Ethernet, it's possible to configure network settings:

DHCP: The Nordic ID Sampo gets the IP address information automatically from the network.

Static IP: The user can manually define the IP address information for the Nordic Sampo.

Network modes

Server: When operating in Server mode, the host application needs to establish the connection to Nordic ID Sampo. Therefore the user has to define a listening port which Nordic ID Sampo opens for incoming connections.

Client: When operating in Client mode, the Nordic ID Sampo establishes the connection to the host application. Therefore the user has to define an IP address and port of the host application for Nordic ID Sampo.

4.3. CONNECTION STATUS

Connection status shows whether the RFID Configurator application is connected or disconnected to the reader. When using manual connection and the connection is established the user can disconnect the reader with the disconnect button.





5. RF LINK AND INVENTORY SETTINGS



Under this segment the user can set the reading related settings for the RFID reader. The optimum settings depend on the use case and these can be found with the Nordic ID RFID Demo software.

Region Europe Link frequency 256 kHz TX modulation PRASK TX modulation PRASK TX Power 500 mW RX Decoding Inventory Session Inventory Target Target A Inventory Session Inventory Target Inventory Target Target A Inventory Session Inventory Target Inventory Target Target A Inventory Session Inventory Target Inventory Target Set the minimum and the maximum RSSI value for read/write/inventory operation. Use 0 to disable filter.	ENTORT	and the second second		The AFID lead					
Ink frequency 255 kHz Invertory Q Auto Q Invertory CPC Length filter in bytes. All other EPC's will be discarded. Use 255 to disable EPC length filter. TX modulation Invertory Solo mW Invertory Target Invertory Target Invertory Target Desired EPC Length filter in bytes. All other EPC's will be discarded. Use 255 to disable EPC length filter. TX now Solo mW Invertory Target Invertory Target Invertory Target Invertory Target Enclose the minimum and the maximum RSSI value for read/write/invertory operation. Use 0 to disable filter. WMARE Notice Invertory Invertory Set the minimum and the maximum RSSI value for read/write/invertory operation. Use 0 to disable filter.		Region	Europe		•				
TX modulation PRASK Rounds Dealed EPC Length filter in bytes. All other EPC's will be discarded. Use 255 to disable EPC length filter. TX Power SolomW Inventory Target Target A INVARE Notification NUR_NOTIFICATION_HOPEVENT is enabled Inventory rounds also Inventory Read Improvement Set the minimum and the maximum RSSI value for read/write/inventory operation. Use 0 to disable filter.	INFOR	Link frequency	256 kHz	•	Inventory Q	Auto Q	•	Inventory EPC Length (bytes) 255	
TX Power 500 mW Inventory Session RX Decoding Miller-4 Inventory Target Inventory Target Target A Inventory Target Inventory Target Inventory Inventory Inventory Inventory Inventory Inventory Inventory Inventory Inventory Inventory Inventory Inventory <t< td=""><td></td><td>TX modulation</td><td>PR-ASK</td><td>•</td><td>Rounds</td><td>Auto Rounds</td><td>•</td><td>Desired EPC Length filter in bytes. All othe discarded. Use 255 to disable EPC length</td><td>er EPC's will be filter</td></t<>		TX modulation	PR-ASK	•	Rounds	Auto Rounds	•	Desired EPC Length filter in bytes. All othe discarded. Use 255 to disable EPC length	er EPC's will be filter
RX Decoding Miller-4 Inventory Target Inventory Target A Inventory Inventory	$\mathbb{P}^{\mathbb{Q}}$	TX Power	500 mW	•	Inventory Session	0	•		
Notification NUR_NOTIFICATION_HOPEVENT is enabled Inventory stream function will report zero count inventory rounds also RSSI Filters (dBm) MIN MAX Read 0 0 0 Write 0 0 0 Write 0 0 0 Inventory 0 0 0 0		RX Decoding	Miller-4	•	Inventory Target	Target A	-		
Proto Read U <			Inventory	stream frunctior	n will report zero count	is enabled	also		
Write 0 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	MWARE	RSSI Filters (dBm)	Inventory MIN	stream frunction	n will report zero count	is enabled	also		
Inventory U T	MWARE 001100 111010 001100	RSSI Filters (dBm) Read	MIN 0	MAX	n will report zero count Set the minimum a	is enabled inventory rounds nd the maximum l	also RSSI val	lue for read/write/inventory operation. Use 0 t	to disable filter.
	MWARE 01100 111010 01100	RSSI Filters (dBm) Read Write	Inventory MIN 0 0 0 0	MAX 0 A	n will report zero count	is enabled inventory rounds nd the maximum l	also RSSI val	lue for read/write/inventory operation. Use 01	to disable filter.
	MWARE 00100 101100 001100	RSSI Filters (dBm) Read Write Inventory	Inventory MIN 0 v 0 v 0 v	MAX 0 ÷ 0 ÷ 0 ÷	n will report zero count	is enabled inventory rounds nd the maximum i	also RSSI val	lue for read/write/inventory operation. Use 0 t	to disable filter.
	WWARE 00100 001100 00100	RSSI Filters (dBm) Read Write Inventory	Inventory MIN 0 v 0 v 0 v 0 v	MAX 0 v 0 v 0 v 0 v	n will report zero count	is enabled inventory rounds nd the maximum I	: also RSSI val	lue for read/write/inventory operation. Use 0 t	to disable filter.

Region: Globally the radio regulations for UHF RFID differ depending on region or country the reader is operated in. These regulations cover the used frequency band, output power, etc. The RFID reader has multiple preset regulatory environments that the user can select from.

Link frequency: The link frequency in tag to reader communication. Higher value enables higher data transmission speeds but is more prone to bit errors. The selectable parameters are 160 kHz, 256 kHz and 320 kHz. Tags that are compliant with ISO18000-6C (EPC C1G2) must support all these parameters.





TX modulation: It is possible to use ASK (amplitude shift keying) or PR-ASK (phase reversed amplitude shift keying) modulation. Tags that are compliant with ISO18000-6C (EPC C1G2) must support both of these modulations. The PR-ASK has lower transmission data rate and because of that it has narrower output spectrum. That's why it is recommended to be used when operating in DRM mode. By default the modulation is set to PR-ASK.

TX level: This setting adjusts the output power of the RFID reader module. Note that this is not the same as radiated power as this also depends on the gain of the attached antenna. The gain of the Nordic ID Sampo's integrated antenna is 8 dBic (5 dBi). Increasing the output power increases the reading distance.

RX decoding: This setting adjusts how the binary data is encoded in tag to reader communication. Four different line encoding schemes are supported. FM0 provides the highest data rate but is more prone to bit errors. On the other hand Miller-8 is the most robust encoding method and therefore suits well for environments with high level of radio interference but the downside is the lower data rate it offers. This slows down the inventory speed.

Inventory Q: Defines the number of time slots in which the tag randomly places the answer. Use higher Q-values when there are multiple tags in the reader's range simultaneously. This reduces the inventory speed but makes reading large quantities of tags faster as there are less data collisions.

The number of slots can be calculated with the following formula: 2^Q. It is recommended that the number of available time slots should be double the number of tags in the reading range. By selecting 'AUTO', the RFID reader automatically adjusts the Q-value which is optimized for the current tag population in the reading range.

Rounds: The rounds setting defines how many query rounds is done inside one inventory round. If data collisions occur during the inventory round, additional rounds are needed in order to read all the tags successfully. After each inventory round the RFID





reader will send data to the host application. The 'AUTO' setting makes the RFID reader to automatically decide after every query round whether another round is necessary based on the number of data collisions.

Session and Target: There are four session options which can be used for reading tags. Every session has two target states A and B. By default Gen2 tags are in state A if the tag has not been read recently. When tag is read it flips to state B and doesn't reply to readers query. The table below describes the persistence of the tag's state machine when using different session values.

Flag	Persistence: tag power ON	Persistence: tag power OFF
SO	indefinite	none
S1	500ms < t < 5s	500ms < t < 5s
52	indefinite	t > 2s
\$3	indefinite	t > 2s

For example when using session 0 the tag will come back to state A immediately after the tag gets unpowered. Usually the tag loses the power when the reader stops the inventory round or changes the channel. With session 1 the tag will keep its state over 500ms but less than 5s. With session values 2 and 3 the tag will keep its state over 2s when tag power is lost. The time can vary depending on what tag IC is used.

By changing the target setting from A target to B target the reader is able to also read tags which have flipped their state into B state. This would happen if tags would have been read recently using session 1, 2 or 3. The RFID reader also supports dual target mode. In that mode the reader will change the target mode automatically between the inventory rounds.

Inventory EPC length: Defines the length of the EPC code in bytes which must be written in the tag, otherwise it will be discarded from the inventory results. Setting the value to 255 will disable the filter.





Notification NUR_NOTIFICATION_HOPEVENT is enabled: Enabling this check box will make the RFID reader to send an event to host application every time the channel has been switched.

Inventory stream function will report zero count inventory rounds also: Enabling this check box will make the RFID reader to report the host application even if no tags were found during the inventory round.

RSSI filters: Set the minimum and maximum signal strength thresholds for read, write inventory operations. Can be used i.e. for limiting the maximum reading range.





6. SENSOR SETTINGS (NORDIC ID SAMPO DEVICES)



Under this segment the user can define how the light and tapping sensors work in Nordic ID Sampo device.

	Sensor Settings Configure the sensor settings	NORDICID
_	Configure sensor settings	
RF LINK &	Configure the behaviour of the light and tapping sensor in the RFID reader. Store the settings into the RFID reader under "Configure the Device".	
	Tap sensor Disabled Triggered Inventory Timeout: 1000 📥 ms	
	Light sensor Disabled Triggered Scan tag Timeout: 500 🖨 ms	
SENSOR		
ANTENNA		
No. 1.4		
FIRMWARE		
1001100 0011010 1001100		
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About		

The following settings are available for both sensors

Disabled: The onboard sensor is disabled.

Enabled – Send notification: When the sensor is activated, the Nordic ID Sampo sends an event to the host application. This information can be used for custom purposes.

Enabled - Scan tag: When the sensor is activated, the Nordic ID Sampo reads just one tag in the reading range. If there are multiple tags in the surroundings, the reader will pick up just the first one to answer. For how long the reader tries to scan the tag can be defined with the 'Scan Tag' timeout setting.

Enabled - Inventory: When the sensor is activated, the Nordic ID Sampo reads multiple tags in the reading range. For how long the reader tries to scan the new tags in the surroundings can be defined with the 'Inventory timeout' setting.





7. ANTENNA SETTINGS (NORDIC ID SAMPO DEVICES)



Under this segment it's possible to select which of the external antenna ports in the Nordic ID Sampo are enabled. Note that all the reader variants do not have external antenna ports. Additionally it's possible to set an enabled antenna as a default one or automatically switch between them.

	Antenna Settings Configure the antenna settings
RF LINK & INVENTORY	Endue the antennas of the n-nD reader and select which the to use, use Auto Switch to aduitiatically switch between endued antennas. Some the settings into the RFID reader under "Configure the Device".
	Enabled Artennas: V Internal Selected Artenna: Auto Switch AUX1
	AUX2 AUX3
FIRMWARE 1001100 0011010 1001100	
About	





8. FIRMWARES

FIRMWARE 1001100 0011010 1001100 Under this segment the user can define the paths for the firmware files which are to be updated into the reader.

	Firmwares elect Franwares for update	NORDICID
	Jpdate Bootloader / Applications	
RF LINK &	Flash firmwares into the RFID reader under "Configure the Device".	
	Bootloader C:\Users\tero.numi\Desktop\nurloader-v1.8-A.bin	Browse
	Application C:\Users\tero.nurmi\Desktop\nurapplication-v3.1-A.bin	Browse
SENSOR SETTINGS	Ethernet C:\Users\tero.numi\Desktop\ARKISTO\SampoEth_1015.bin	Browse
FIRMWARE 1001100 001101 1001100		
DEVICE		
bout		





9. CONFIGURE THE DEVICE



Under this segment the user can apply the settings into the RFID reader.

NOTE: If you are going to update a new bootloader, application and Ethernet (Ethernet Sampo variant) firmware into the unit, it is recommended that the bootloader firmware is applied first!

Upd	ate device c	onfiguration			
RY		м	odule connected (seria	: S00000XYZ)	
	arget Mod	el:	Actions:		Connected device:
	SAMPO S1 -	USB Table Reader 🔹	Configure the Device	Name Serial	SAMPO S1 S00000XYZ
т	ask:			Alt Serial	501299 ECC: SCCNUR05W (JC: 51274 NUR05W
	7 Flash Boo	tloader (nurloader-v1.8-A.bin)	Read Configuration	Hardware version	NOTSET
	/ Flash App	lication (nurapplication-v3.1-A.bin)	Restore factory defaults	Application version	3.1 A
ŝ	Set RF Lin	nk and Inventory configuration	Restart		
5	/ Set Senso	or configuration			
	Set Anten	na configuration	Load Settings from file		
E			Save Settings to file		
	Timestamp	Log			
	137780	Invalid mode. Backup suspended.			
	137796	Please wait			
RE	139325	Programming done			
	139543	Writing application			
· · · · · · · · · · · · · · · · · · ·	139559	Please wait			
2	144785	Programming done			
	145003	Entering application			

Target Model: This shows the model of the RFID reader which is connected to the configuration software.

Task: A list of settings/updates which can be applied into the RFID reader. A particular set of settings will be applied into the reader if the corresponding check box is checked. **Actions:**

- **'Configure the device':** This button will execute and apply the selected settings into the RFID reader.
- 'Read Configuration': Read the current configuration from the RFID reader.
- **'Restore factory defaults':** This will restore all the altered settings into default values.
- 'Restart': Restart the RFID reader





- **'Load Settings from file':** Load settings from a previously saved file into the RFID Configurator. Note that you still need to press the 'Configure Device' button to apply them into the reader.
- 'Save Settings to file': Save settings into a file for later use.

Connected device: Shows the serial number etc. information retrieved from the connected device.





SUPPORT

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