ECO READER

9965432 - User Manual

TECHNICAL SUPPORT

CONTENTS

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PRECAUTIONS

- Installation of these products should be performed by a qualified installation partner.
- Do not use the product in damp places.
- If you smell smoke or other odors or hear a strange sound, unplug the power cord and contact your dealer.
- Make sure to connect the power cable to a properly earthed outlet.
- Protect the power cord from physical or mechanical abuse, such as being twisted, kinked, pinched, closed in a door, or walked upon. Pay particular attention to plugs, wall outlets, and the point where the cord exits the Eco Reader.
- Do not disassemble, repair or modify the product at your own discretion.
- To reduce the risk of electrical shock or damage, do not expose this device to rain or moisture.
- Refer all servicing to qualified service personnel. Servicing is required when the system has been damaged in any way, such as power supply cord or plug is damaged, liquid has been spilled, or the device has been dropped.

When your Eco Reader is of version REV.A (which can be seen on top of the PCB), and/or it has a warning sticker next to the BNC connectors, do not connect an unterminated coaxial cable to one of its RF outputs! This may permanently damage the Eco Reader. To be sure, turn off power before you do any work or maintenance on the Eco Reader.

FCC ID: CGDECO41356   IC: 1444A-ECO41356

Compliance statements (part15.19)
This device complies with part 15 of the FCC Rules and to RSS210 of Industry Canada.
Operation is subject to the following two conditions:
(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

Cet appareil se conforme aux normes RSS210 exemptés de license du Industry Canada.
L'opération est soumis aux deux conditions suivantes:
(1) cet appareil ne doit causer aucune interférence, et
(2) cet appareil doit accepter n'importe quelle interférence, y inclus interférence qui peut causer une opération non pas voulu de cet appareil.

Warning (part15.21)
Changes or modifications not expressly approved by party responsible for compliance could void the user's authority to operate the equipment.

INTRODUCTION

BEFORE YOU START

We would like to thank you for buying a Nedap Librix Eco Reader RFID system. The Eco Reader can be used in combination with Nedap Librix anti-theft antennas, Nedap Librix Intelligent shelves and Nedap Librix Autosort products. The Eco Reader is specially developed to have a low energy consumption during operation, and the additional capability to switch its output power off at times when it is not needed.

Some of its functions are:

- Reads ISO15693 and ISO18000-3.1 compatible RFID tags
- Has an internal 4 channel multiplexer, which allows it to connect to up to four 50Ω@13.56Mhz inductive loop antennas. Optionally this can be expanded by using splitters, or an external multiplexer.
- Can connect 4x customer counting aisles
- Energy saving module
- Librixonline.com connectivity
- Internal webpage for easy configuration of settings

UNPACKING

Check your Eco Reader product box for the following items. If there are any items missing, contact the local dealer where you purchased the product. The illustrations in this manual may differ from the actual product and item.

1x Eco Reader   1x Power adapter   1x Power cable

1x DIN rail   1x USB cable   1x Buzzer

1x Power adapter mounting kit
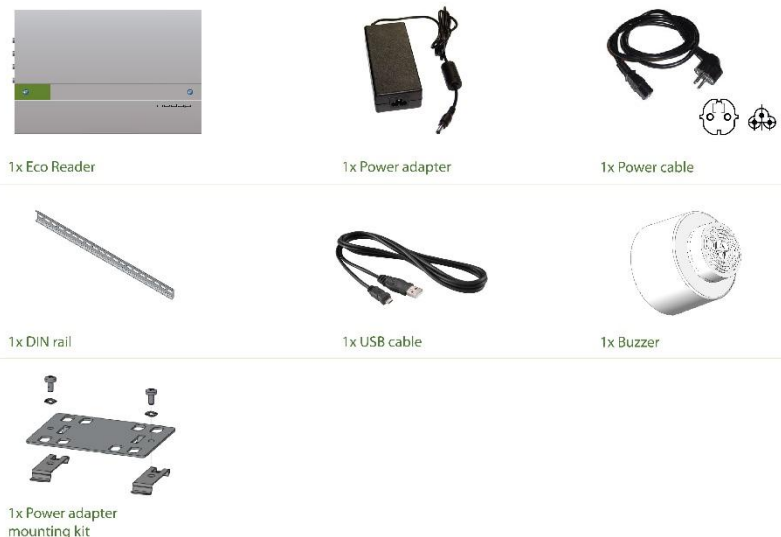
1. An C5 power cable with European plug is delivered with the Eco Reader. Plugs for other countries should be ordered separately.

HARDWARE INSTALLATION

INTRODUCTION

This chapter describes the physical installation of the Eco Reader, connecting antennas, cabling customer counting and beeper, etc. For the software configuration please refer to the chapter 'software configuration'.

The following paragraphs are in the same order as the installation steps should be performed.

CONNECTORS

The Eco Reader has several connectors to connect peripherals to. See the figures below for a description.
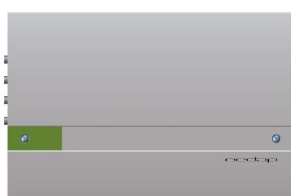
Top View
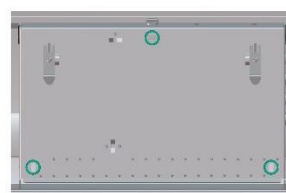
Bottom View
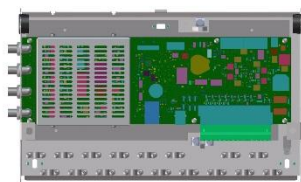
Top View - without Cover
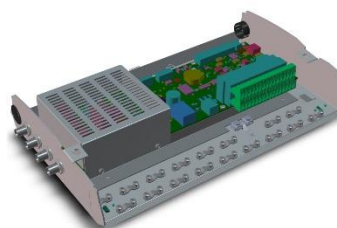
Perspective View - without Cover

Figure 1 ECO Reader
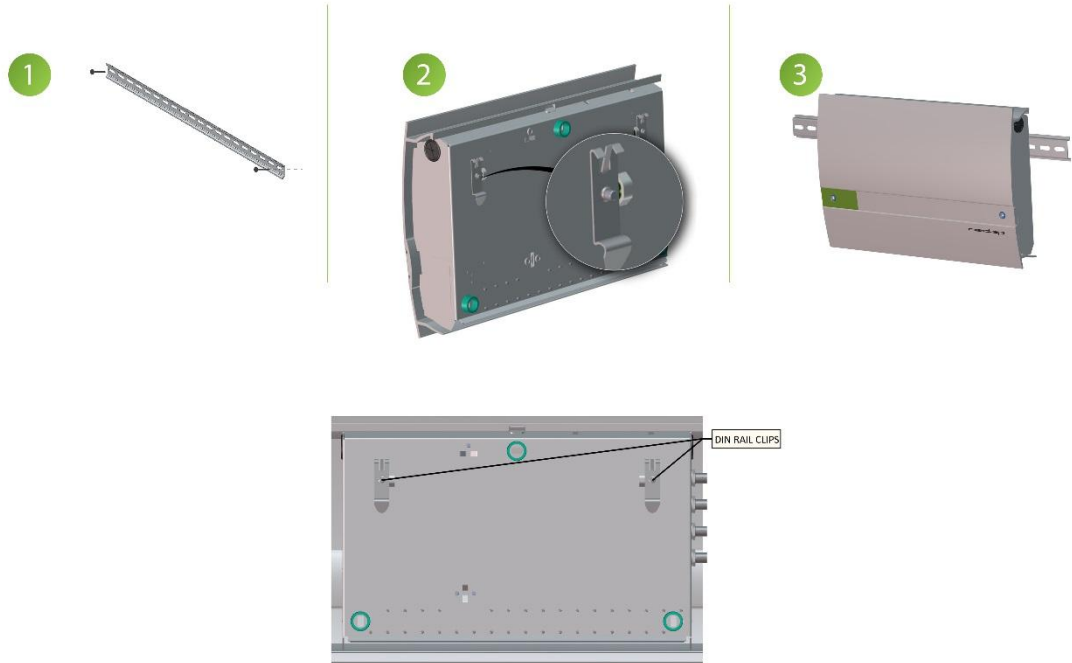
Figure 2 - DIN rail clips
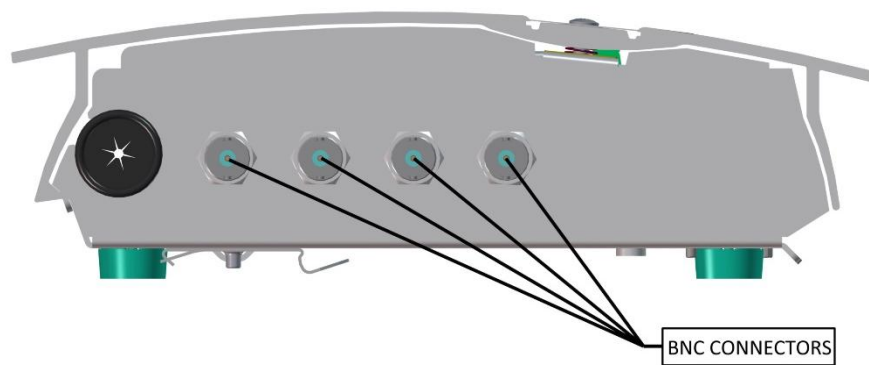
Figure 3 - BNC connectors

PERIPHERAL CONNECTORS
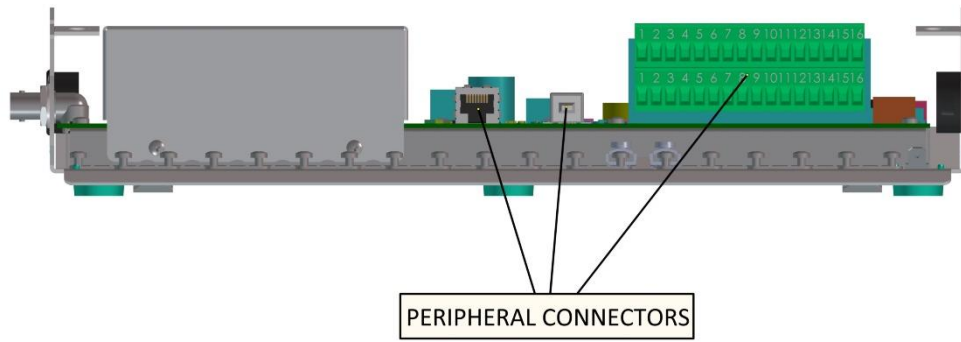
Figure 4 - Peripheral connectors

POWER CONNECTOR
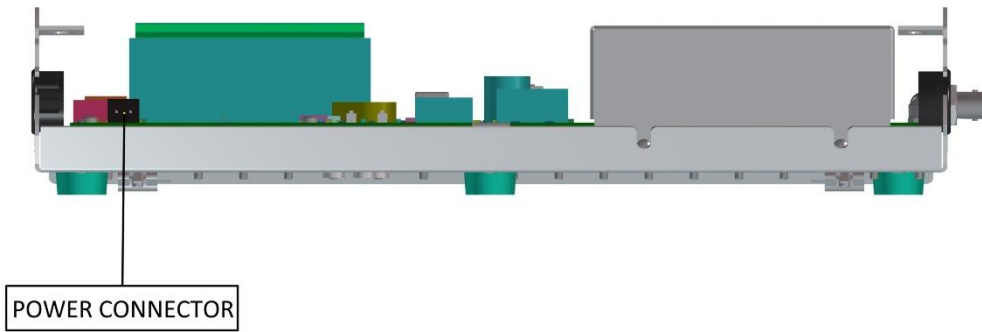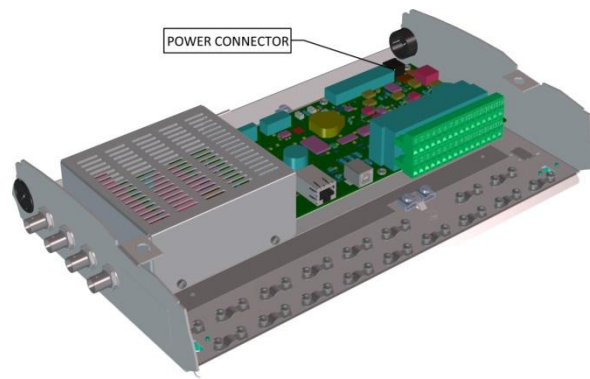
POWER CONNECTOR

Figure 5 - Power connector
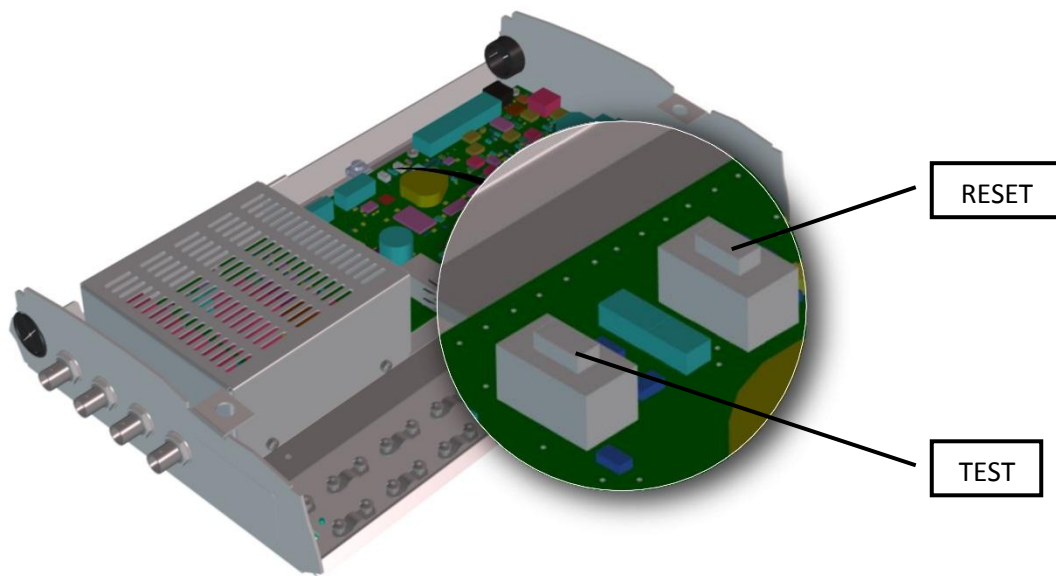
RESET

TEST

Figure 6 - Top view, test and reset button

MOUNTING THE ECO READER

The Eco Reader can be mounted to a vertical surface by using the supplied DIN rail. Use the appropriate screws and tools for the surface you are mounting on. The Eco Reader weighs approximately 2.6kg, so make sure the surface can carry this weight. The Eco Reader can be 'clicked' on the DIN rail. Use the provided 'power adapter mounting kit' to attach the power supply to the DIN rail to.

Although the Eco Reader does not produce much heat, and is passively cooled, it should not be installed in a space where the temperature can rise above 50˚C.

CONNECTING THE ANTENNAS

The antenna connected to the Eco Reader should be a 50Ω@13.56Mhz resonant antenna. All Nedap Librix gates fulfill this requirement. Only antennas produced or approved by Nedap Librix may be connected to the Eco Reader.

When your Eco Reader is of version REV.A (which can be seen on top of the PCB), and/or it has a warning sticker next to the BNC connectors, do not connect an unterminated coaxial cable to one of its RF outputs! This may permanently damage the Eco Reader. To be sure, turn off power before you do any work or maintenance on the Eco Reader.

Cables and wires

Belden 9907 or RG58

Antennas must be connected to the Eco Reader by using coaxial cables and BNC connectors. The coaxial cable should be of type 'Belden 9907' or 'RG58'.

The BNC should be properly fit to the coaxial cable, where the outer wire does not touch the inner wire.

Ten wire braided shield data cable

Use a braided shield (like data cable) for communication with customer counting, external multiplexer, or any other external board. Nedap Librix recommends using a "LIYCY" data cable with wire dimensions of $0.25mm^2$.

"LIYCY" means:

LI   = flexible cable

Y   = PVC insulation

C   = shield of braided copper wire

Y   = PVC outside
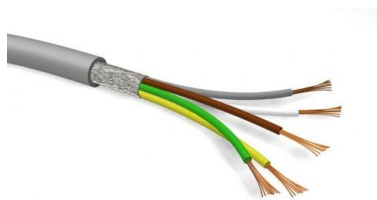
Figure 7 - "LIYCY" data cable

Filters

If the antennas were supplied with ferrite filters, put 1x filter around the coaxial cable leaving the antenna, and 1x filter around the optional customer counting data cable leaving the antenna. Make sure to place the filter near the antenna. When using PG or MDF antennas, these filters can be placed in the foot of the antenna.

Figure 8 - cable filter

Security Antenna configurations

There are some possible configurations of connecting PG antennas to the Eco Reader based on the number of aisles that are needed. The Eco Reader has an internal 4-way multiplexer, which allows you to connect 4 antennas to one Eco Reader without any additional splitters or multiplexers. It is not necessary to always connect 4 antennas, which makes it also possible for connecting only 2 antennas. Here are some examples:

PG45: 2-loop

PG50: 0-loop

PG45: 3-loop

PG50: 2-loop
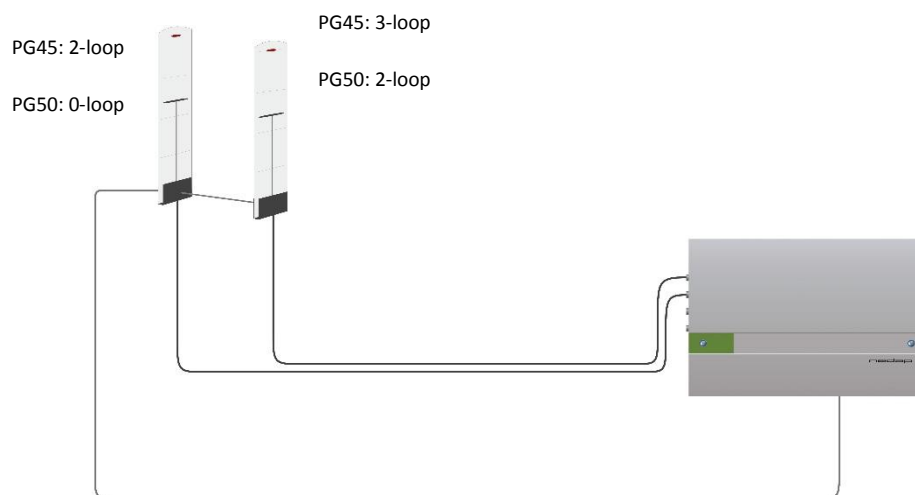
Figure 9 - 1 aisle, antennas directly on Eco Reader, and connection for customer counting

PG45: 2-loop   PG45: 3-loop   PG45: 2-loop

PG50: 2-loop   PG50: 0-loop   PG50: 2-loop
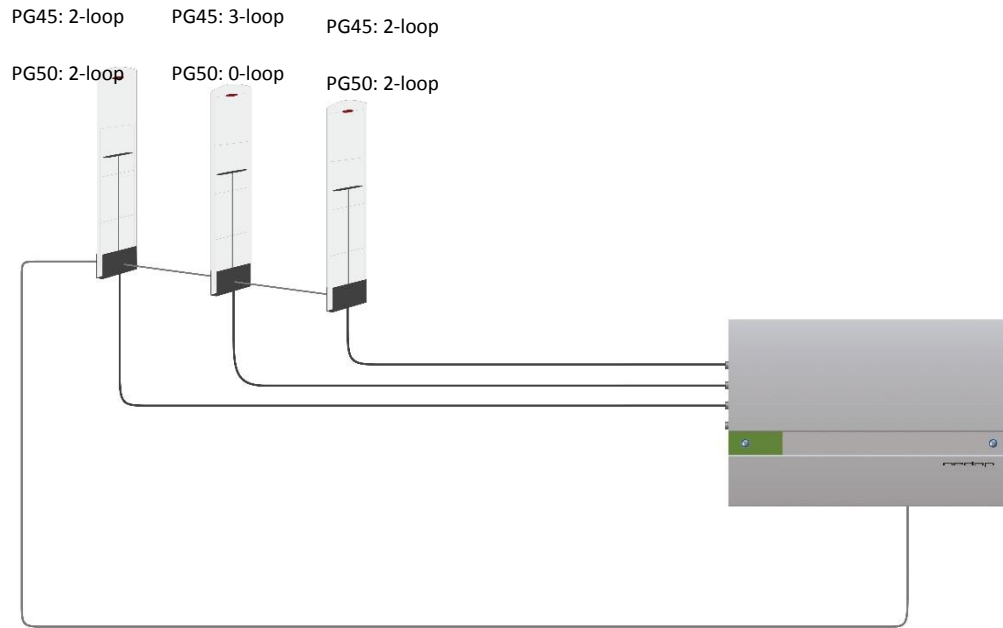
Figure 10 - 2 aisles, antennas directly on Eco Reader, and connection for customer counting

PG45: 2-loop   PG45: 3-loop   PG45: 2-loop   PG45: 3-loop

PG50: 2-loop   PG50: 0-loop   PG50: 2-loop   PG50: 0-loop
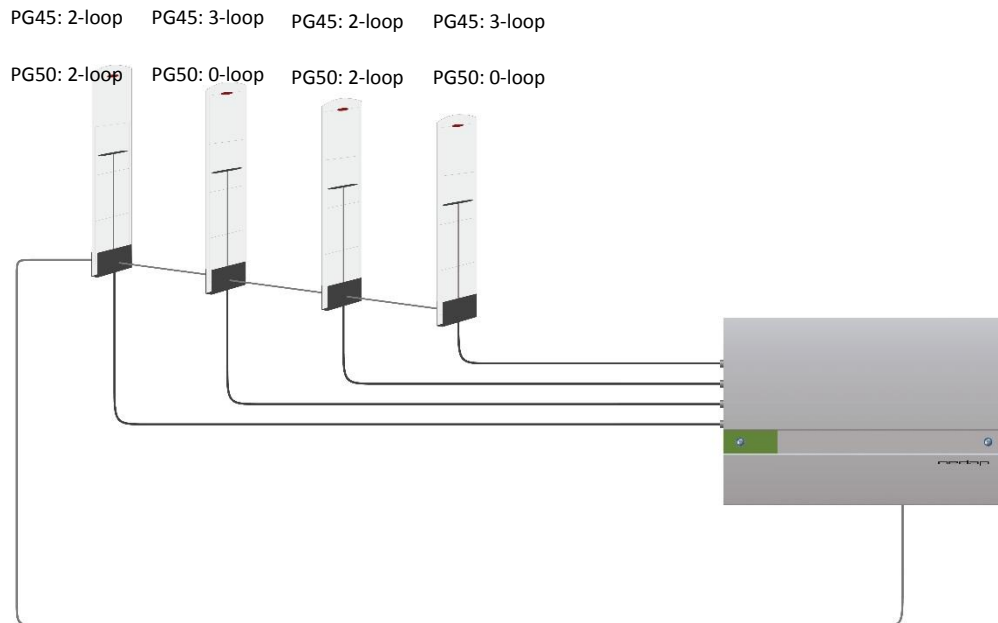
Figure 11 - 3 aisles, antennas directly on Eco Reader, and connection for customer counting

Coaxial cable length

To obtain the maximum reading performance on a PG gate with the Eco Reader, a specific cable length should be used. The cable length is important for any connection, regardless if it is between

the reader and a splitter, or splitter and antenna, or directly from reader to antenna. The appropriate cable length is dependent on the type of gate used and type of coaxial cable used.

There are different ways to determine the optimal cable length:

1. use the table in appendix A of this document. In this table the appropriate length for different types of antennas is given.
2. use a vector impedance analyzer to measure the resistance and reactance of the antenna on 13.1Mhz or 13.9Mhz sidebands. On these sidebands the resistance should be as high as possible (>150Ω), and the reactance should be zero. See a more detailed description in appendix B of this document. Possible vector impedance analyzers are:
   a. AEA Technology's Via Bravo handheld
   b. Rohde&Schwarz ZVL Vector Network Analyzer (advanced equipment)
3. use an SWR analyzer with the capability to measure resistance and reactance on 13.1Mhz or 13.9Mhz sideband, like the MFJ Enterprises' MFJ-259B HF/VHF SWR analyzer. The more detailed description in appendix B of this document, also applies to this device.

When the optimal cable length is determined, roll-up the excess cable length and mount it near the Eco Reader.

CONNECTING THE ALARM

The buzzer that is delivered together with the Eco Reader should be connected with its red and black wire to the +24V and BUZ1 pins on connector K8 of the Eco Reader. BUZ1 is an open collector NPN input that is pulled to ground when an alarm should sound.

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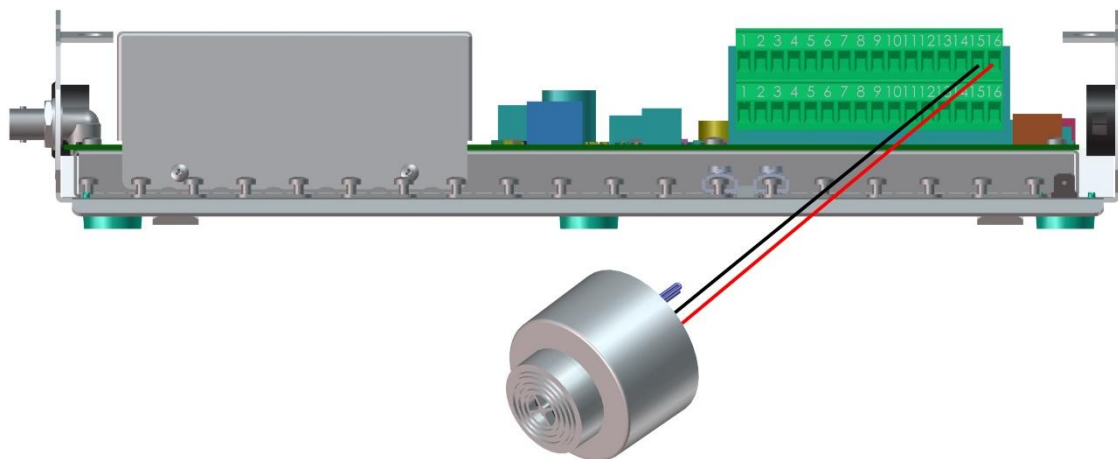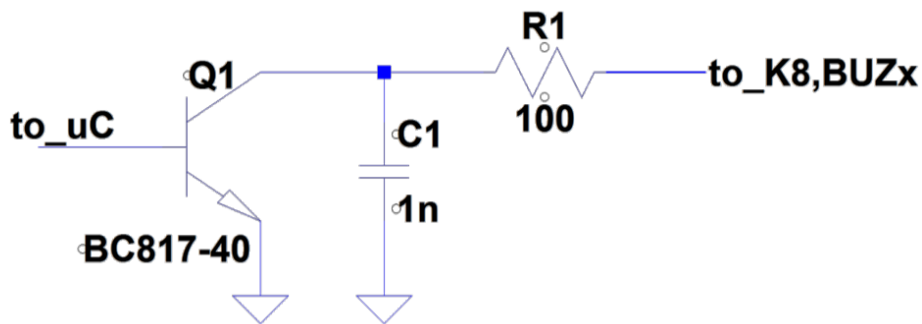
Figure 12 - Schematic of open-collector BUZx output

The connection schematic for the buzzer should be:

- Red -> +24V
- Black -> BUZ1

BUZ2 is a 2nd buzzer port to which another audible alarm can be connected with a different alarm time (not standard delivered).

CONNECTING POWER

The Eco Reader needs a +24V DC power supply of 65Watts, which is delivered together with unit. The power connector K17 is on the top side of the Eco Reader. When the power is connected 4x LEDs will light up on the middle of the PCB. All LEDs should light up, to ensure that all internal power supplies are properly working. Some other status LEDs will also light up.
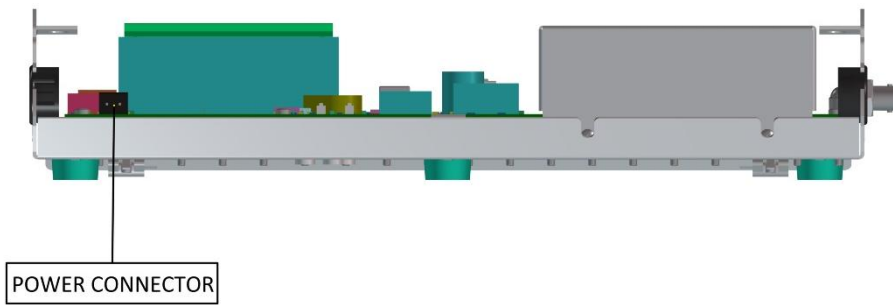
POWER CONNECTOR

CONNECTING CUSTOMER COUNTING {OPTIONAL}

Up to 4x aisles of customer counting can be connected to the Eco Reader. Make sure to wire the customer counting modules inside the PG antennas in the appropriate way. Connector K8 has 8x inputs called CC1 up to CC8. For aisle 1 use CC1 and CC2, for aisle 2 use CC3 and CC4, etc. The customer counting receivers should be connected in the right direction to properly distinguish an incoming from an outgoing customer.

CC1
CC2
CC3
CC4
CC5
CC6
CC7
CC8
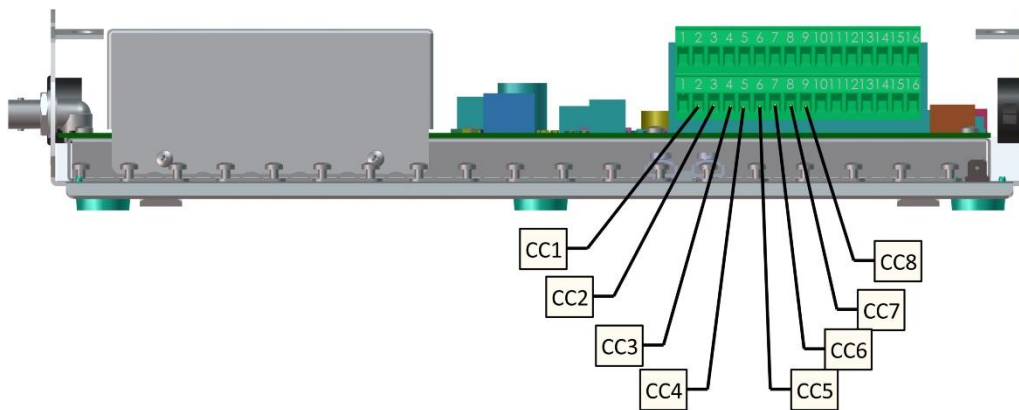
The correct connection of the customer counter inputs can be determined in test mode of the Eco Reader. In this test mode the alarm light of the antennas will blink 4x slowly when the customer counter detected an incoming customer, and they will blink 8x fast when it detected an outgoing customer.

An example of the customer counting wiring is included in the appendix.
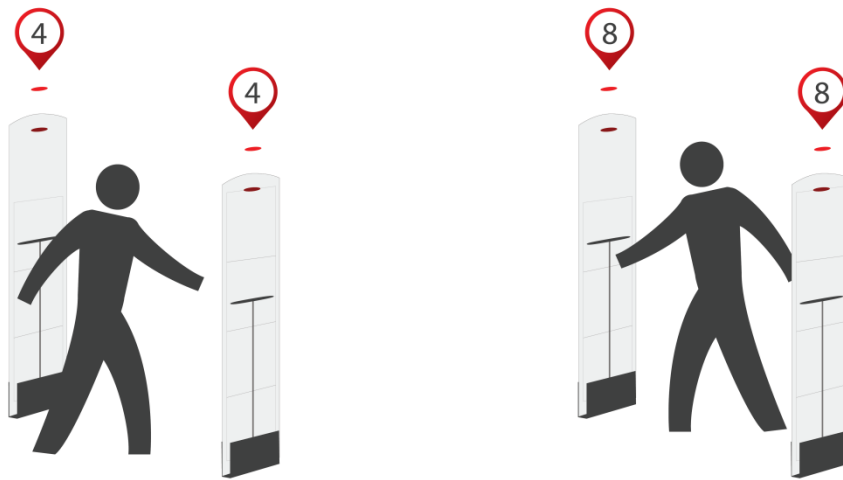
Figure 13 - customer counting test mode

Test mode can be started by pressing the test button (see Figure 6) and holding it for some time. The Eco Reader leaves mode 60 seconds after the last test was performed or it disconnects and re-connects the power to the Eco Reader.

CONNECTING TO USB {OPTIONAL}

The Eco Reader can be connected to a pc or laptop with an USB cable. On rev.A of the PCB a micro-usb connector should be used on the Eco Reader, on rev.E of the PCB a type B usb connector should be used. This USB cable is delivered together with the Eco Reader.
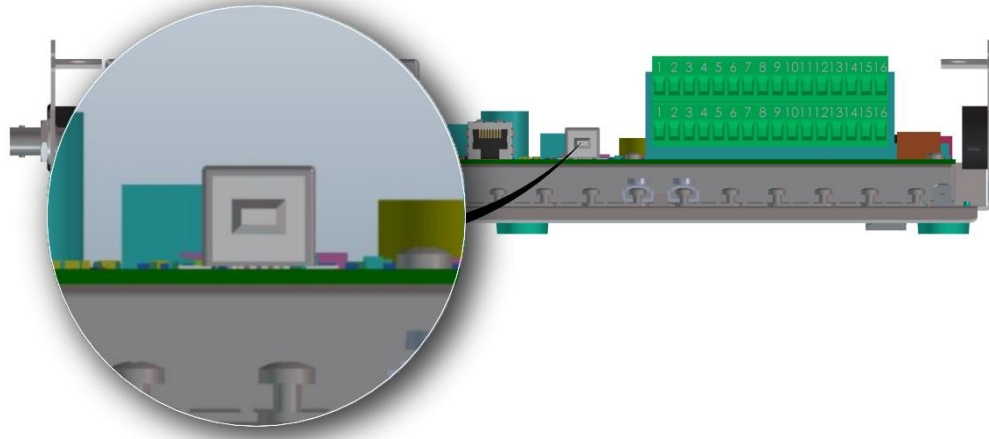
Figure 14 USB Connector

A driver is required to communicate with the Eco Reader. This driver for windows is available on the support site of Nedap Librix , but will be available natively for most other OS, like mac, linux. In windows7 an automatic search of the driver on the internet, will also find the correct driver.

Once connected and installed the Eco Reader will be available on a virtual com port. To this a connection can be made with programs like rftest.lite or any other Nedap Librix' software. To be able to configure all the settings of the Eco Reader, rftest.lite version 3.0.0 or higher is needed.

CONNECTING TO ETHERNET {OPTIONAL}

The Eco Reader can be connected to any 10/100Mbit network with shielded UTP cable. Use the LAN connector on the PCB for this. The Eco Reader is default set to use DHCP to obtain an IP-address, but can also be configured to a static IP-address. The program rftest.lite can be used to search for all Eco Readers in the network, and in this way its IP-address can be retrieved.
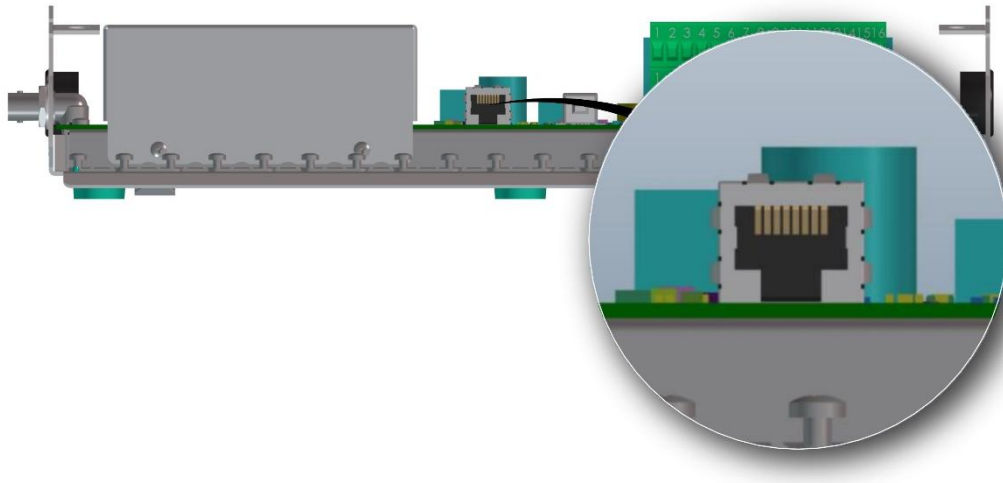
Figure 15 Ethernet Connector

CONNECTING THE RELAIS {OPTIONAL}

The Eco Reader is equipped with 2x relais, with a common (C), normally open (NO) and normally closed (NC) contact separately supplied on connector K8 for both of them. When an alarm sounds the relais change their state. The amount of time before the relais change back to their 'normal' state can be configured in the settings.

The relais is of type 'Omron G6S' which can switch a purely resistive load with 2A at 30VDC. Please refer to the datasheet of the relais on the manufacturer's website for other specifications.

SOFTWARE CONFIGURATION

INTRODUCTION
This chapter describes how the Eco Reader can be configured. Most configuration needs to be done when the Eco Reader is used in combination with Security Antennas. When the Eco Reader is used in combination with Intelligent shelves, it is controlled from a PC. Rftest.lite 3.0.0 or higher may be required when communication is done over USB.

RFTEST.LITE OR WEBPAGE?
The Eco Reader can be configured with the windows program rftest.lite or over its internal webpage. When rftest.lite is used the Eco Reader can be configured over its usb connection or over its network connection. When the webpage is used the Eco Reader must have a network connection and a properly configured IP-address. When the IP-address is entered in a web browser, the internal configuration page of the Eco Reader is shown, after the 'Settings' tab in the top-right corner is clicked. It is advised to use the latest version of Firefox (14.0 or higher) , Chrome (20.0 or higher) or Internet Explorer (9 or higher) to make sure that the page is properly displayed.

Figure 16 - Eco Reader internal webpage

USING THE WEBPAGE
The internal webpage of the Eco Reader has 2x tabs, whose buttons are located in the top-right corner of the browser window:

- home
- settings

Home page
On the home page the customer counter values combined for all connected gates are shown. There are two icons which show incoming and outgoing customers. E.g. in Figure 16 there are 103 incoming, and 100 outgoing customers. Please refer to chapter "*Connecting Customer Counting*" for instructions on how to properly connect the customer counter sensors to the Eco Reader. These values are updated regularly, without the need to refresh the webpage.

In the bottom-left part of the home page, the 'Reset' and 'Update' buttons are shown.

Figure 17 - Customer counter reset and update

When 'Reset' is clicked, the customer counter values go back to zero. The 'Update' button forces a refresh of the customer counter values.

In the bottom-right part of the home page a 'world-globe' icon is shown when the Eco Reader has a connection to librixonline.com. When you do not see this, but there should be a connection, contact your local IT specialist to resolve the network problems you are experiencing.

Figure 18 - World globe indiciating librixonline.com connection

In the top-left corner of the webpage the Eco Reader 'leaf' indicates if the Security Antennas are enabled or disabled. When the radiation waves are coming out of the leaf, the antennas are working.

Figure 19 - 'Radiating' leaf means gates are enabled

Settings page

By clicking the 'Settings' tab in the top-right corner, the settings and other information of the Eco Reader is displayed. The settings are grouped in a 'tree' shape, and can be expanded by clicking the '+' sign in front of an option. The important settings are explained in the following paragraphs.

When a setting is changed, a 'disk' 💾 icon appears next to the setting. This icon has to be clicked to save the setting.

NETWORK SETTINGS

By default the Eco Reader will use DHCP to obtain an IP-address on the local network. If a static IP-address is required, the Eco Reader must be re-configured. Rftest.lite can be used to find an Eco Reader on the network. Rftest.lite needs to run on a windows computer that is connected to that network.

Finding the Eco Reader on the network

The following steps explain how the Eco Reader can be discovered on the network with rftest.lite. Although version 3.0.0 is required for configuring all settings, discovering can already be done with version 2.1.0 or higher of rftest.lite

1. start rftest.lite on a windows based system that is connected to the network, and which has no firewall installed, or any other system that prevents it from having full access to the network.
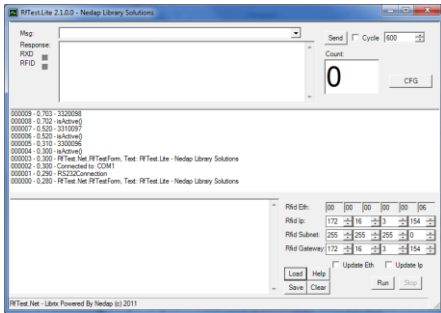
2. In rftest.lite click on the 'CFG' button in the top-right corner
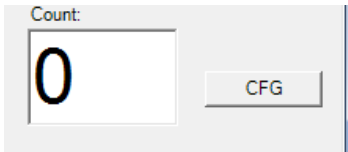
3. In the communication setup screen, select 'Use UDP port' and enter '8004' as the UDP Port. The UDP Host value is not important at this moment.
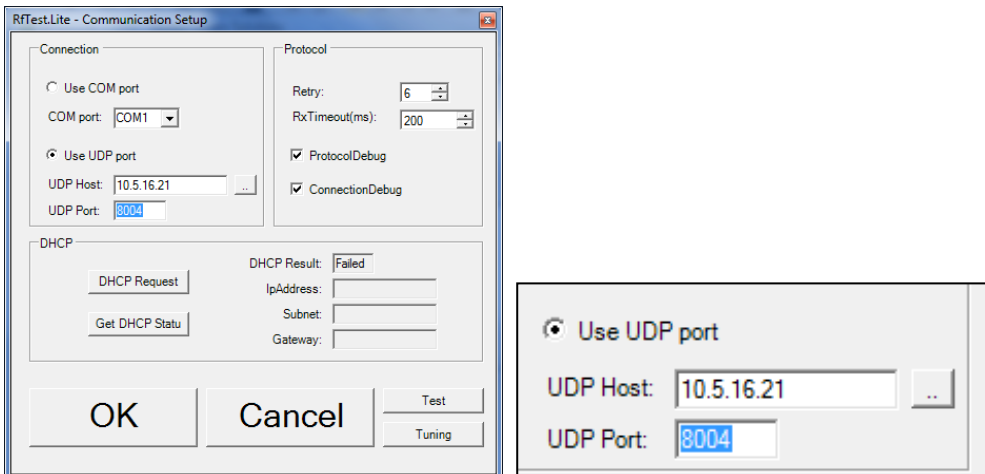
4. Click on the '..' button behind 'UDP Host:'.
5. Press 'Search' in the 'Detector' window that appears next.
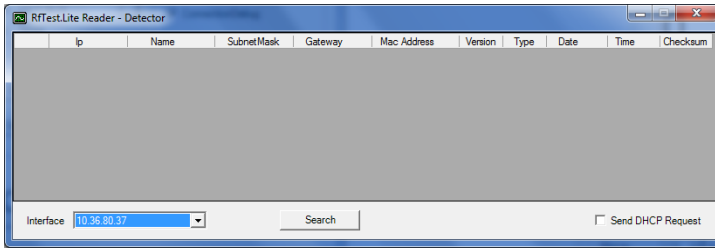
6. All discovered Eco Readers will be displayed in the list, together with their IP-address, hostname, mac address, etc. Double click on the Eco Reader of your interest, to select it.
7. Once selected press 'Test' in the 'Communication Setup' to test the communication with the Eco Reader.

8. When 'RfidReader not active' is reported, there is probably a problem in your network. Contact your local IT specialist for assistance.

Configuring the network settings with a webpage

1. Go to the Settings > Communication > Tcp/Ip page
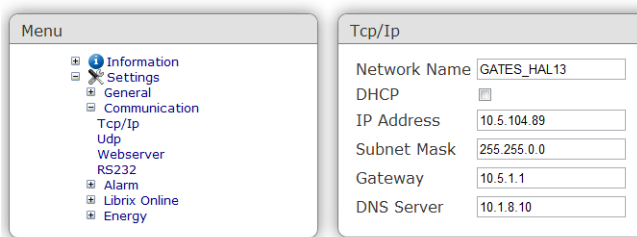
2. On the right part, the network name, DHCP setting, fixed IP-address, and all other network settings can be changed. Please consult your local IT specialist for the right settings for your network.
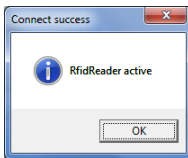

The other 'Communication' subpages, like 'Udp', 'Webserver', and 'RS232', are internal used variables, which in 99.9% of the cases can be left to their default values. Changes should only be done by a qualified person. Please contact Nedap Librix if you need assistance on these settings.

Configuring the IP-address with rftest.lite

1. Make sure there is a working connection between rftest.lite and the Eco Reader.
2. Click the 'tuning' button on the 'Communication Setup' windows of rftest.lite
3. Go to the first tab 'IP Networking'. Over there you can find DHCP, and fixed IP-address settings.

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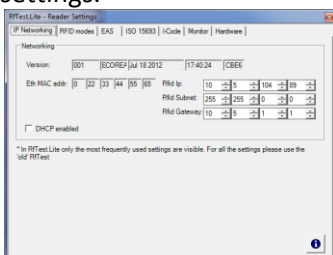
ADMINISTRATOR ACCESS

Some settings (like RFID output power) are only accessible when you are logged in into the Eco Reader as administrator. In order to do this go to the top-right corner of the configuration webpage, and enter in the 'User' and 'Pass' textboxes the following.

User: admin

Pass: admin
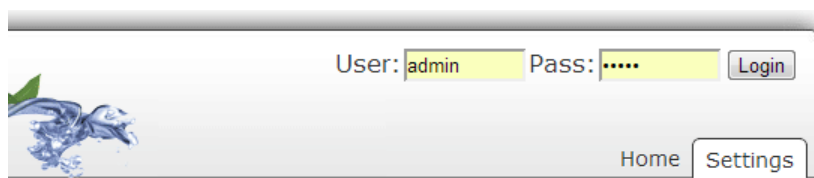
ENABLING POWER

To enable the output power of the Eco Reader, you need to be logged in as administrator as described in the previous paragraph. When that is done, you will find an new item in the tree on the left side of the page, called 'RFID > Signal'. Click on this item and on the right hand side of the page a setting for the output power will appear.
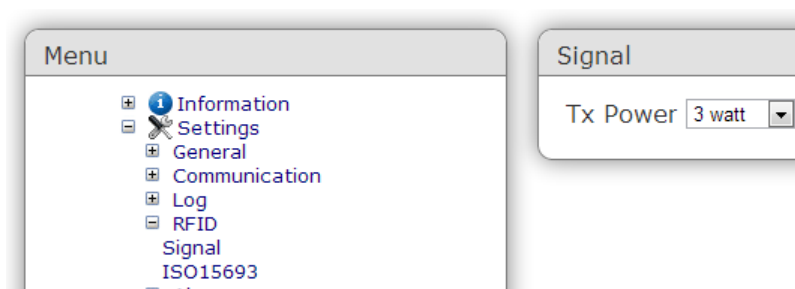
ALARM SETTINGS

The alarm settings need to be set when the Eco Reader is used in combination with security gates. The alarm functionality should be switched off, when the Eco Reader is used in combination with other software, that is controlling the Eco Reader. Simultaneous use of alarm and other software will affect performance in a negative manner.

Internal webpage
1. Go to the Settings > Alarm > Alarm page
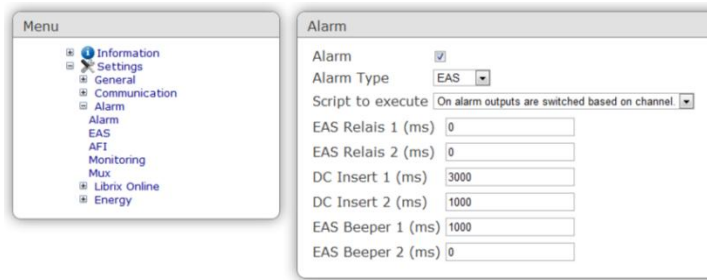
2. Configure the settings as desired:
   a. *Alarm*:   turn on/off the alarm functionality
   b. *Alarm type*:   choose EAS, AFI or both as alarm type. EAS has better performance than AFI, but is 'only' available in NXP chips.
   c. *Script to execute*:   the behavior of the lights in the gates can be altered, by selecting a different script. Either the lights on antennas on both mux output are switched on, or only for the gate that detected the label.
   d. *EAS Relais 1 (ms)*:   time that the 1st relais stays on after an alarm
   e. *EAS Relais 2 (ms)*:   time that the 2nd relais stays on after an alarm
   f. *DC Insert 1 (ms)*:   time that the lights of the gate(s) on mux channel 1 stay on after an alarm.
   g. *DC Insert 2 (ms)*:   time that the lights of the gate(s) on mux channel 2 stay on after an alarm.
   h. *DC Insert 3 (ms)*:   time that the lights of the gate(s) on mux channel 2 stay on after an alarm.
   i. *DC Insert 4 (ms)*:   time that the lights of the gate(s) on mux channel 2 stay on after an alarm.
   j. *EAS Beeper 1 (ms)*:   time that the 1st beep stays on after an alarm
   k. *EAS Beeper 2 (ms)*:   time that the 2nd (optional) beeper stays on after an alarm
3. When EAS is chosen as Alarm Type, the EAS page can be used to change the detection threshold. In 99.9% of the cases the default value is right.

4. When AFI is chosen as Alarm Type, the AFI page can be used to set the AFI values for which the alarm should go off.
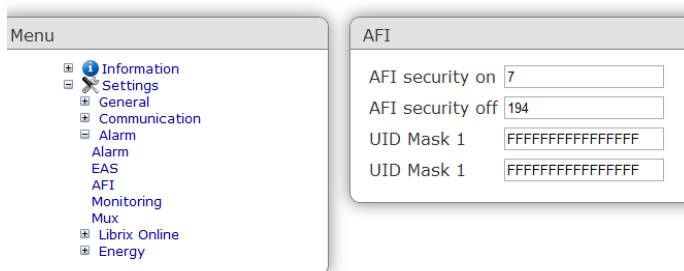
   a. *AFI security on*: the AFI value for which an alarm should go off
   b. *AFI security off*: the AFI value which indicates an RFID tag with alarm switched off
   c. *UID Mask 1*:   enter an UID mask, like 'FFFFFFFFFFFFFFE0' to minimize false AFI alarms. Consult Nedap Librix for more help.
   d. *UID Mask 2*:   enter an 2nd UID mask, like 'FFFFFFFFFFFF04E0' to minimize false AFI alarms. Consult Nedap Librix for more help.
5. Use the monitoring page to enter the settings of the pc that is running 'Bibliocheck4Monitor', which allows the customer to see which 'AFI' book caused an alarm. ***THIS FUNCTION WILL NOT WORK WITH ALARM TYPE "EAS"!***
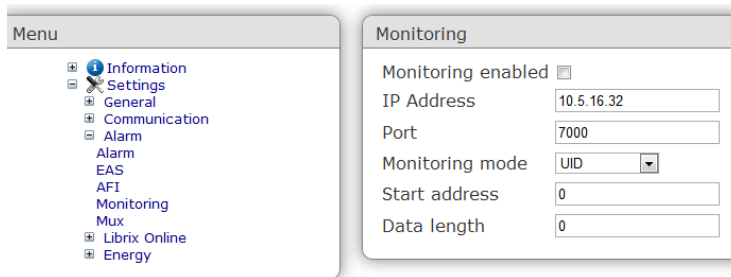
a. *Monitoring enabled*:　　　　　Enable\disable the AFI monitoring
b. *IP Address*:　　　　　　　　Enter the IP-address of the pc that is running Bibliocheck4Monitor. Make sure the network is not blocking any communication between the Eco Reader and this pc.
c. *Port*　　　　　　　　　　Enter the port which should be used for communication
d. *Monitoring mode*:　　　　　Specify here if only the 'UID' or 'UID+Data' should be read from an alarming RFID tag.
e. *Start address + Data length*: Specify the start address and length of the data inside the RFID tag, that should be read.

6. Use the mux page to select the internal 2x channel multiplexer, or an external combination of multiplexers.
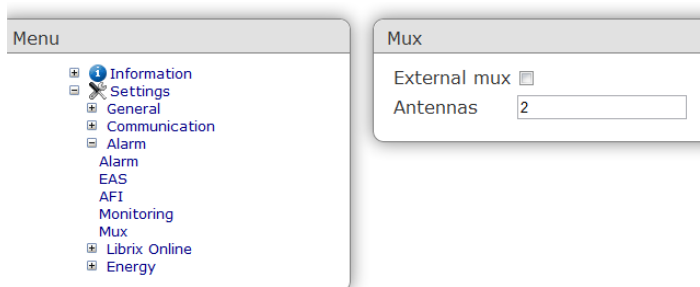
7.
a. *External mux*:　　　　　select if an external mux is connected. If it is, use RF1 port to connect the multiplexer to. RF2, RF3 & RF4 is disabled. When 'External mux' is disabled, the internal multiplexer is enabled, depending on the number of Antennas.
b. *Antennas*　　　　　　Set the amount of antennas that are connected. For the internal mux the maximum is 4.

LIBRIX ONLINE

When the Eco Reader should communicate with librixonline.com, it should have a registered ReaderID. This ReaderID can be generated on the librixonline.com website, and should be copied to the Eco Reader.

1. Go to Settings > Librix Online > Authorization
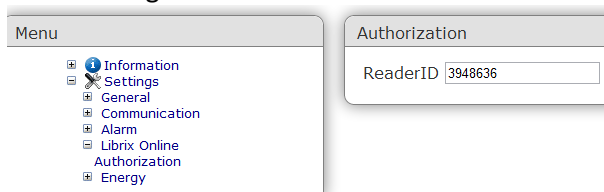
2. Enter the reader id in the field 'ReaderID'

As described in paragraph "*Using the webpage*" a 'world globe' in the bottom-right corner of the page, indicates a successful connection to librixonline.com.

ENERGY MANAGEMENT

A powerful energy saving feature of the Eco Reader is the ability to turn on and off the power to the gates at certain times of the day.

1. Go to Settings > Energy > Power scheduling
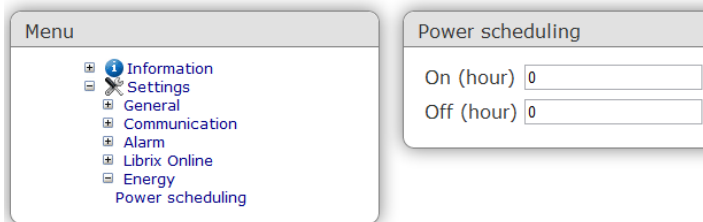
2. In 'On (hour)' enter the hour of the day the reader should turn on, and in 'Off (hour)' enter the hour of the day the reader should turn off.

FIRMWARE UPGRADE (WITH FILE UPDATE)

Updating the Eco Reader firmware can only be done with the internal website via a network connection.

Browse to the internal website of the Eco Reader and log in using the default username/ password : *admin/ admin ,*   the tab "Firmware" should then appear:
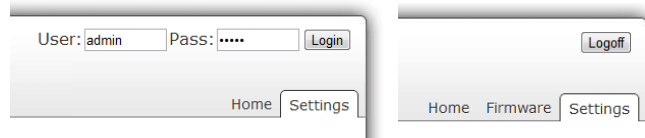
Click the Browse… button and locate your "firmware_<version nr.>_.pac"-file, and click Open.
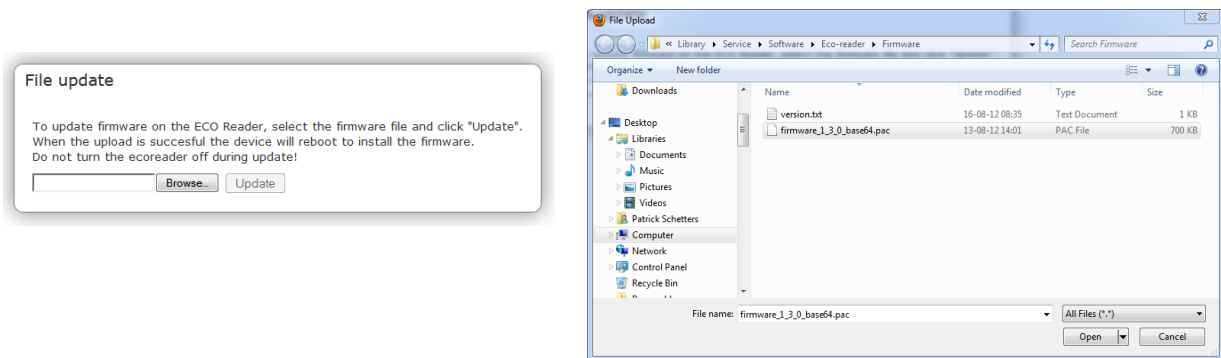
Then click Update, a progress bar will show the status of the file upload process…
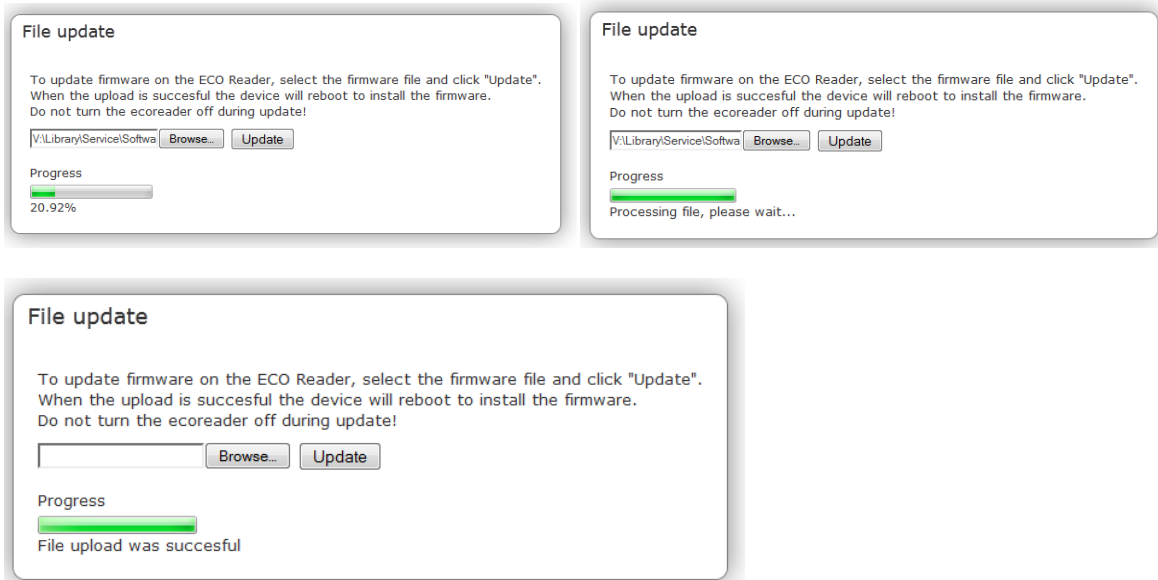
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APPENDIX A

To obtain the maximum reading performance with the Eco Reader and various antenna gates, a specific cable length should be used. The minimum, starting cable length l_0 that should be used, is given in the table below. When a longer cable is required, every time a fixed size cable l_n should be added. The total cable length l will be:

$$l = l_0 + n * l_n, where\ n\ is\ 0,1,2,3,4,...$$

Art.nr.	Description	RG58		BELDEN 9907[*1]	
		l_0(m)	l_n(m)	l_0(m)	l_n(m)
	PG50 8-loop with CC and lamp	5.1	7.0	6.09	8.37
	PG50 0-loop with CC and lamp	5.0	7.0	5.98	8.37
	PG45 8-loop with CC and lamp	3.0	7.0	3.59	8.37
	PG45 3-loop with CC and lamp	2.54	7.0	3.04	8.37
	Ecoreader to 2-way splitter or multiplexer	5.0		6.0	

[*1]*Calculated according to values in the Cable length guide for the DVD reader.*

The average ratio between RG58 and Belden 9907 is 1 : 1.195

*when your product is not in this list, contact Nedap Librix or go to

appendix b for instructions on how to manually determine the optimal cable length

CONVERSION FROM DVD TO ECOREADER

When a DVD RFID Reader needs to be replaced with an Eco Reader, it is possible that you need to change the cable length. It is advised to do the following:

1. Exchange the DVD for an Eco Reader and perform tests to see if the existing cables function within expectations.
2. If the performance is not satisfactory, change the cable length by adding or removing some cable. In the table below you can find the amount of cable that needs to be added or removed (depending of what fits best in the situation).

USED CABLE	ADD OR REMOVE
RG58	3.5m
Belden 9907	4.18m

3. In case the performance is still not satisfactory perform the measurement steps in appendix B.

APPENDIX B

The optimal cable length is obtained when the sidebands of a 50Ω antenna have a high resistance, and low reactance. There are several ways of measuring this, but one popular way is a smith chart. In Figure 20 a smith chart is shown of a pg45 3-loop antenna with the proper cable length. The green circle shows the resistance and reactance of the antenna for frequencies from 13.06Mhz to 14.06Mhz. Marker 1 is set on 13.56Mhz, and it can be see that the resistance is ~50Ω and reactance ~j0Ω. Marker 2 & 3 are on the 13.1Mhz & 13.9Mhz sideband, and there the resistance is >180Ω and the reactance approaches ~j0Ω.
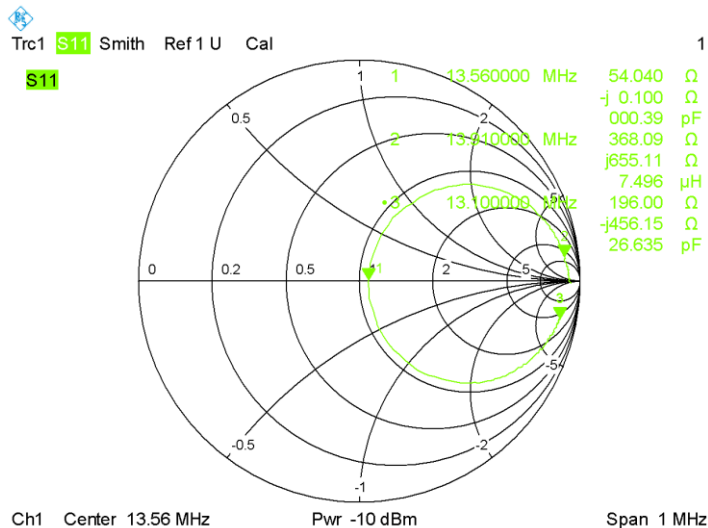
Figure 20 - smith chart of pg45, 3-loop

Figure 21 shows the smith chart for a pg45 8-loop with improper cable length. The 13.1Mhz & 13.9Mhz sidebands are now ~1Ω and their reactances are not approaching j0Ω. Adding coaxial cable to this antenna will make the circle rotate clock-wise around marker 1. In appendix a we gave a cable length of about 3m to rotate the circle to correct position.
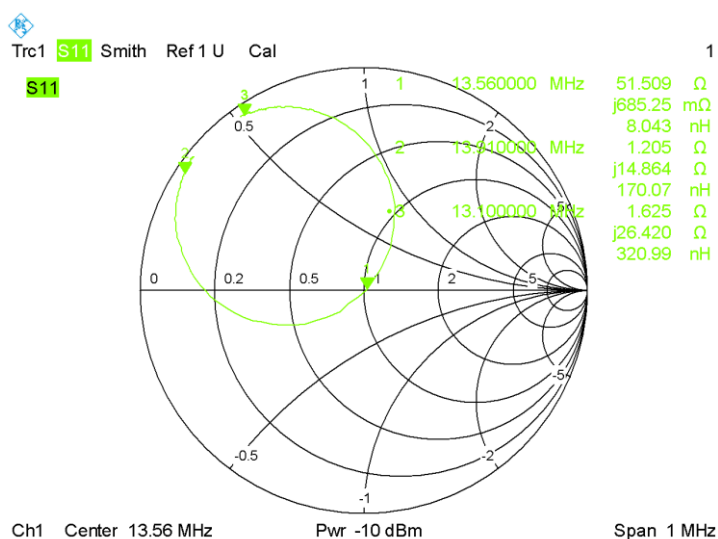
Figure 21 - PG45 8-loop with improper cable length

When a vector impedance analyzer like the:

- **AEA Technologies Via Bravo or Via Analyzer**
  *this analyzer can show a smith chart, but you need additional pc software. The analyzer shows a bode-plot of the antenna over a specific frequency range, which can also be used to determine the resistance and reactance of the sidebands.

- **Rohde & Schwarz ZVL**
  * this advanced machine can show smith charts, but also has a spectrum analyzer included. It is over qualified for the job, but a must have for any antenna enthusiast!

- **MFJ Enterprises**
  *simple machine which measures resistance and reactance for one frequency. It cannot plot any charts, but does the trick.

is used, the optimal cable length can be determined manually, by performing the following steps:

1. Install the antenna gates and all wires (coaxial, data cables) as usual, but make sure that you at least have an excess coaxial cable length of 7m.
2. Strip the coaxial cable, and manually insert it into your measuring device.
3. Measure the resistance and reactance. If the resistance is >180Ω and reactance is approaching j0Ω, you're cable length is fine, and go to step 6.
4. If the resistance if very low, cut off a piece of the coaxial cable (~10cm)

5. Go to step 2 and keep cutting the cable until you have reached the right cable length.

When you have determined the right cable length, connect a BNC connector to the cable, roll-up the excess cable length, and mount it near the Eco Reader.

APPENDIX C: RELAYS

RELAY USED IN NEDAP READERS

The relays used in the Nedap readers used for RFID applications for libraries are Single Side Stable. This implies that the switch contacts in the relay remain in a normal or stable position as long as no power is applied to the coil. There is a normally open (N/O) and a normally closed (N/C) contact. When power is applied to the coil, the contacts move to a new position, but stay in that position as long as power is applied to the coil.

RF TEST

With RF Test, the closed time settings can be adjusted to support the hardware connected to the reader.

CONTACT RATINGS

Load	Resistive load ($|\cos \phi| = 1$)
Rated load	0.5 A at 125 VAC; 2 A at 30 VDC
Contact material	Ag (Au-clad)
Rated carry current	2 A
Max. switching voltage	250 VAC, 220 DC
Max. switching current	2 A
Max. switching capacity	62.5 VA, 60 W
Min. permissible load	10 μA at 10 mVDC

APPROVED STANDARDS

UL1950 / CSA C22.2 No.950

file: CC PG50 PG45 diverse voorbeelden

jumpers for antenna-adjust (factory-set)

trimmer for antenna-adjust (factory-set)

coil for antenna-adjust (factory-set)

sensor status

LEDs

CC pwr

alarm led

BNC-connector to READER or SPLITTER or MULTIPLEXER

info

RJ11 connector (optional)

connector for CC-sensor cable

connector for CC-datacable

DC for panellighting

info

datacable

8 6 4 2   13 Vdc

GND   7 5 3 1

sensor

Bl   IN1   Rd
GND   13Vdc

Gn
GND   IN2   13Vdc

Max. 4CC/row (= 4 isles)

PG45 antennamatch + CC

wiring for PG45 2-isle system with CC on ECO reader

datacable
8 6 4 2   13 Vdc
GND   7 5 3 1

panel # 1
CC Rx

datacable
8 6 4 2   13 Vdc
GND   7 5 3 1

panel # 2
CC Tx / Rx

datacable
8 6 4 2   13 Vdc
GND   7 5 3 1

panel # 3
CC Tx

ECO-reader

K8

Rudi Beijers 19-07-2013

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nedap