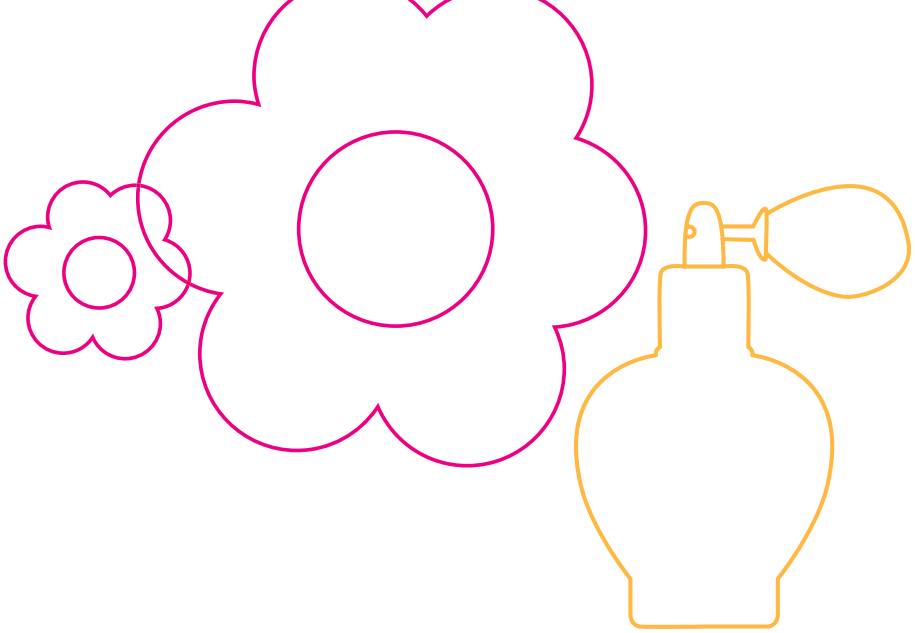
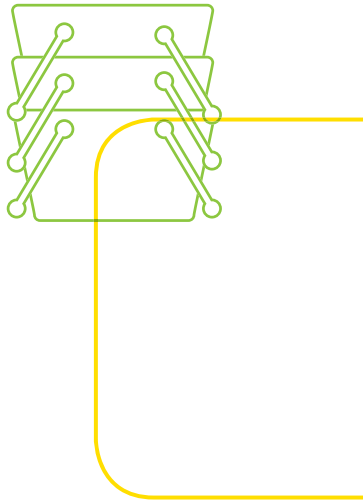


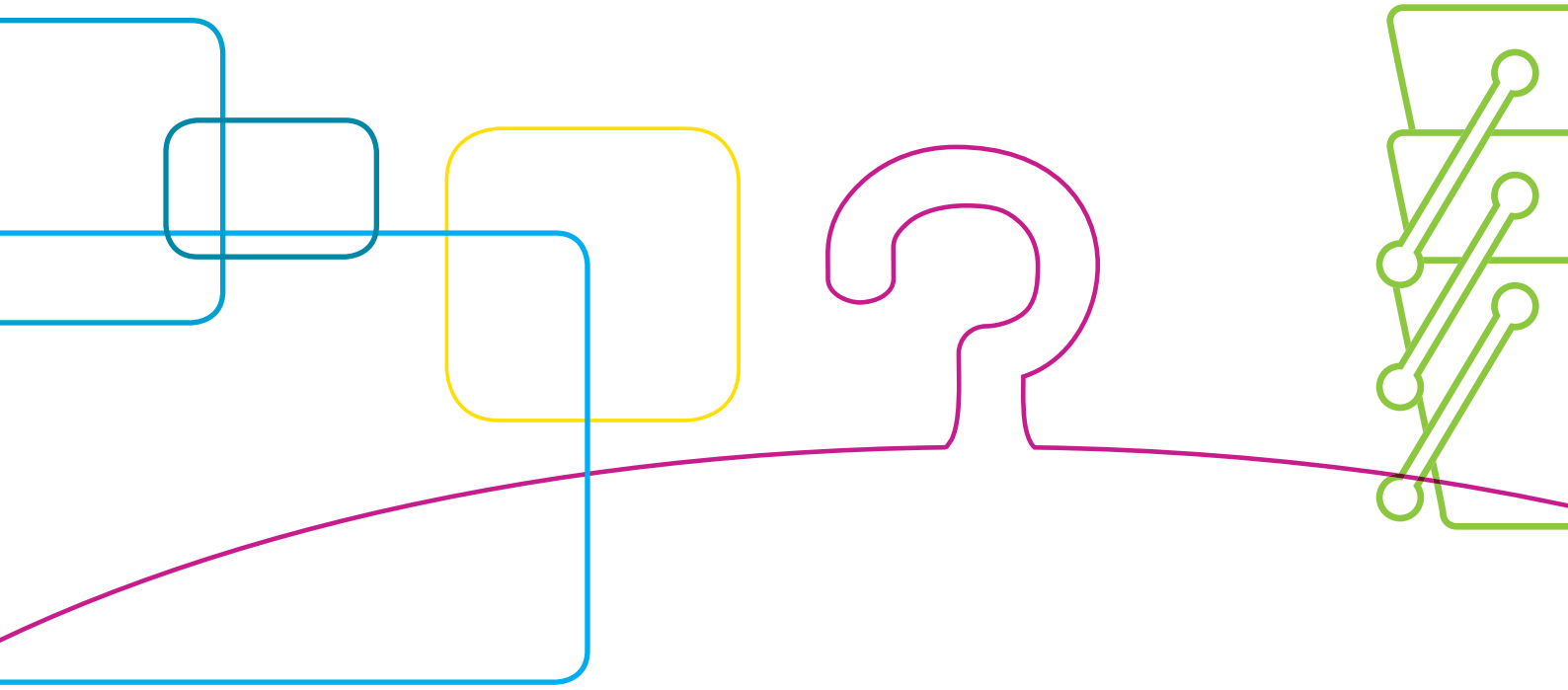


nedap

RETAIL

X2 Electronics

MANUAL

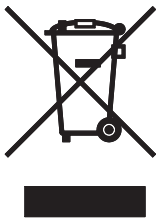


Februari 2012

Technical Support

E-Mail : support-rs@nedap.com

Safety precautions

	CAUTION - RISK OF ELECTRIC SHOCK - DO NOT OPEN
CAUTION: TO REDUCE THE RISK OF ELECTRICAL SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED NEDAP SERVICE PERSONNEL.	
	Lightning flash with an arrowhead, enclosed in a triangle, alerts you to the presence of uninsulated voltage points inside the product which could cause a serious electrical shock.
	An exclamation mark enclosed in a triangle alerts you to important operating and maintenance instructions in the documentation provided with the product.
WARNING! To avoid the risk of fire or electrical shock, never expose these products to water or operate in a high humidity environment.	
 EN 50419:2005	EN 50419:2005 This European Standard specifies a marking • of electrical and electronic equipment in accordance with Article 11(2) of Directive 2002/96/EC (WEEE); This is in addition to the marking requirement in Article 10(3) of this Directive which requires producers to mark electrical and electronic equipment put on the market after 13 August 2005 with a 'crossed-out wheeled bin' symbol. • that applies to electrical and electronic equipment falling under Annex IA of Directive 2002/96/EC, provided the equipment concerned is not part of another type of equipment that does not fall within the scope of this Directive. Annex IB of Directive 2002/96/EC contains an indicative list of the products, which fall under the categories set out in Annex IA of this Directive; • that serves to clearly identify the producer of the equipment and that the equipment has been put on the market after 13 August 2005.

Documentation version SAFETY Manual X2 2012

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Digital Printed in the Netherlands

Table of Contents

1. Introduction

- System adapt to any environment
- Cognitive (Radio) system (Software Defined Radio)
- It monitors the utilization of the RF spectrum in the neighborhood, and configures it self for best performance
- Quickly and easily upgradeable with enhanced features
- Can be reconfigured "on-the-fly": Detection or label analyzer

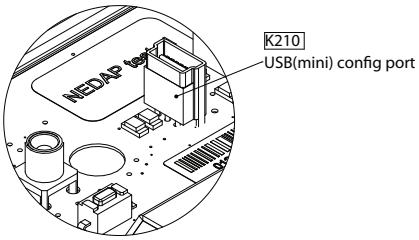
Software radio is the art and science of building radios using software. By radio, we mean any kind of device that intentionally transmits or receives signals in the radio frequency (RF) part of the electromagnetic spectrum.
Given the constraints of today's technology, there is still some RF hardware involved, but the idea is to get the software as close to the antenna as is feasible. Ultimately, we're turning hardware solutions into software solutions.

The label analyzer has an increased detection range, and has a quick detection and deactivation including important information like accurate Q and frequency measurement. It can also measure differences in deactivation levels.

The detection system can function without NCC and can be switched into a master.

1.1 Communication functions

Communication remote assistance or data delivery is done by use of an NCC MK2 master unit. There are no onboard communication functions. With a combination of customer counting and above capabilities you can use, alter and monitor remote-diagnostics, firmware-upgrade and system configurations.



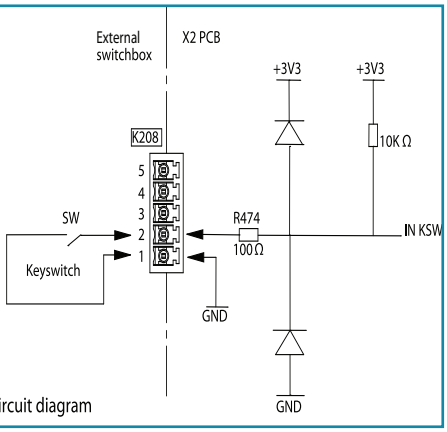
To communicate with the Nedap Configuration Manager, a connection through USB has to be established. This is a connection between the onboard Mini-USB connector K210 and an USB connector in the PC or laptop.

1.2 Customer Counting

The X2 PCB has Customer Counting possibilities for one aisle. Gathered data can be shown on the Easinet™.

1.3 Key Switch

The X2 can be fitted with an Key Switch. The switch has to be connected to K208 (for connector images, see 1.2 Customer Counting).



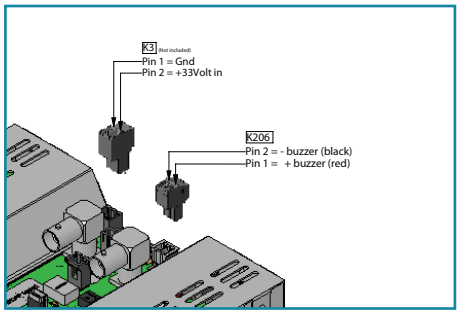
1.4 Crying Funtion

X2 electronics are standard fitted with a buzzer for the crying function. The buzzer will be connected to connector K206.

The buzzer is fitted to a mounting plate.

1.5 Benefits

- 1 aisle CC option (K208)
- 1 opto input for key switch (K208)
- Standard delivered with a buzzer for use of the crying function option (K206)
- Configuration Manager connection by USB



1.6 Software version

The latest version of the Configuration Manager must be installed for use with the new electronics The sweep time has changed, there fore all units in a system must have firmware version 2.xxx or higher!

2. Block diagram SDR PCB

The X2 PCB combines the communication control unit, the transmitter and receiver in one single unit.

2.1 Network communication control

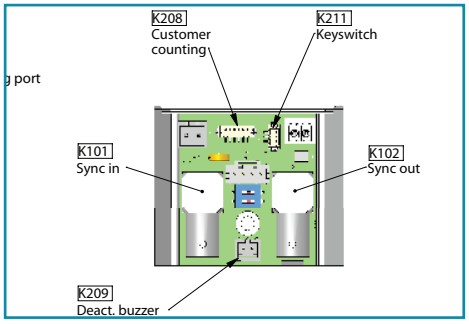
For network communication an external NCC (NCC MK2, SQ) is necessary.

2.1.1 Hand-terminal-connection

The use of a handheld terminal is not available for the X2 unit.

2.1.2 Data communication over coax and Power

One of the important features of the X2 electronics is the data-com over the coax cable. With this feature it's not necessary to use an extra data-cable between the units, which simplifies the installation of the system. An NCC MK2 unit plays a central roll in providing the data-com. All the connected units are interrogated periodically by this unit. If there are messages like an alarm on a connected X2 unit, then the NCC MK2 unit will process this and takes the necessary action: Sending a command to turn on the lamps on the activated aisle.
The X2 has two slave-sync connectors (K101 and K102) from which the unit can be driven from a NCC MK2, SQ, DQ or another networking unit.



X2 electronics can also act as a stand-alone unit, without the need for any synchronization. DC power supply always from its own Master DC input connector K3 or from the power inserter.

2.2 Anti-deactivation regulation (Detection mode)

To prevent unwanted deactivation during detection of a label, the transmitted power will be reduced when a label is in its proximity. It is a high speed loop. The user will not notice a difference in response.

2.3 Tag Analyzer

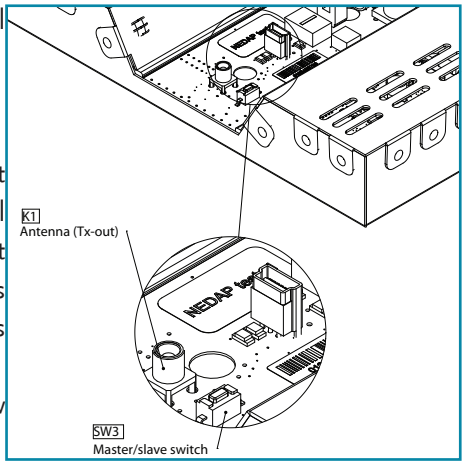
In tag analyzer mode, the power is constant. The tag analyzer has the ability to detect, store label information, like accurate Q and frequency measurement. It can also measure differences in deactivation levels.

By using a piezo a label can be detected, the signal strength will be visualized by a repeating audio signal. When a label is no longer detected, the gathered information will be stored. When a low Q label is detected, the transmitter signal will be increased; the label will be quicker deactivated.

2.4 Transceiver section

The X2 makes use of the pulse (transmitter) and listen (receiver) technique. This is the same technique used with radar. This gives the freedom to use it with mono-antennas.
The X2 uses a transceiver architecture that gives the highest flexibility possible today. The analog signal from the antenna is almost directly converted to digital domain. The transmitter signal is just before the antenna converted to analog.
The analog to digital converter (ADC) has a high dynamic range and runs on a high frequency. This gives the possibility to handle strong interference without clipping/distorting the wanted label signal in the receiver.
The antenna is connected to K1.
When a single unit X2 is stand-alone no synchronization is necessary. In all other situations the transceiver needs to be synchronized for best performance.

The receiver receives its RF reference signal and configuration data from the local communication control section.

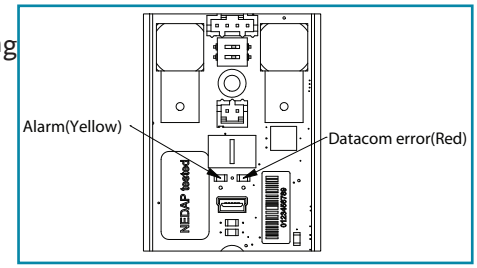


Transmitter:
Although the effective RF power is in the same range as our high power swept system, the peak signals are much higher. As a consequence of that, the label can be deactivated at larger distances from the antenna compared to the swept system. For that reason the X2 has an RF power-control. This control will reduce it's transmit power when it detects a label within the deactivation range. Interferences like a swept system will be suppressed from influencing the power-control.
In the label analyzer mode the TX power will not decrease, but increase when a low Q-factor label is brought into the detection field.

Receiver:
The selectivity and dynamic range is very high. The selectivity is achieved with advanced high-speed digital filter techniques. This gives the advantages to be able to work in environments with large level interferences.

2.5 Master - Slave settings and status LEDs

Changing the unit functionality between slave and master can be done by pushing button SW3. (See page 20)



2.5.1 View X2 electronics Status

Press button SW3 1x (See page 20).
- When the yellow LED starts to blink and the red LED burns continiously, the X2 is set as a slave.
- When both LED's are blinking, the X2 is set as master.

2.5.2 Change X2 functionality

Press button SW3 (See page 20) 2x within 5 seconds to switch to master (or slave) status. The X2 electronics is standard programmed as slave.

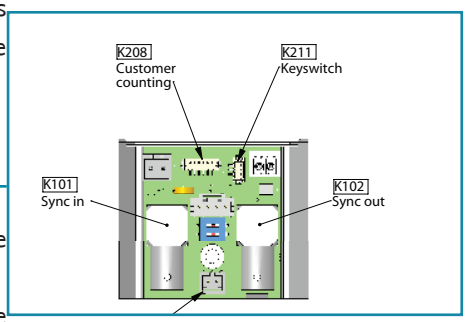
2.6 X2 approved antennas

Nedap has a broad range of antennas. Not all antennas are approved in combination with the X2 electronics. In the near future more and more antennas will be X2 ready. It is important to know that only HIGH POWER antenna's can be used for safety reasons.

At the time of writing this document the following Nedap antennas are approved for use with X2 electronics:
- FL30
- FL45
- D40
- D50
- PG27
- PG39
- EQ45-F

2.7 Data communication

The X2 uses the same communication and synchronization signals as the sweep system of Nedap Retail. The transceiver is a slave. Slaves are polled by the master. The communication control section, which is the master unit, polls periodically all connected slaves and relays data to other devices e.q. other control units or PC's.
With every sweep one slave is polled. The polled slave must answer, this happens in the same sweep. These poll and answer data packets are used implement the network functionality.

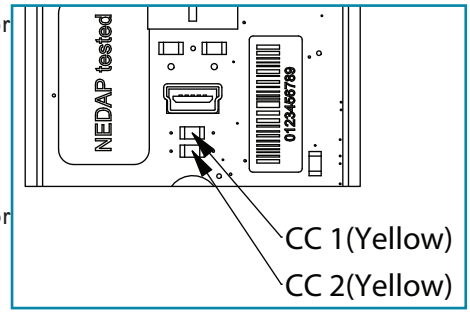


2.8 Customer counting

The X2 PCB is prepared with customer counting on board. 2 Sensors can be connected to monitor 1 entrance with direction sensitivity.
The passage between sensors is shaped and buffered and processed by the processor. In this way incoming and outgoing label alarms can be counted for separately.

The customer counting wires can be connected to connector K208.

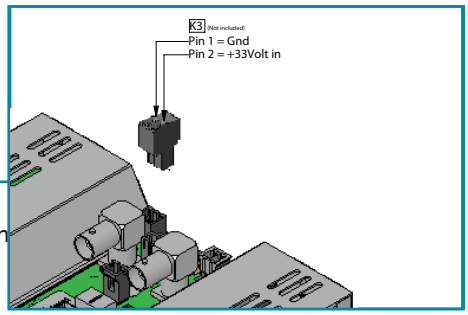
The sensor power output is 12 V dc. It is possible to connect sensor with positive or negative going output signals.



Two customer counting status LED's are situated on the PCB to indicate if the sensors are fully functional.

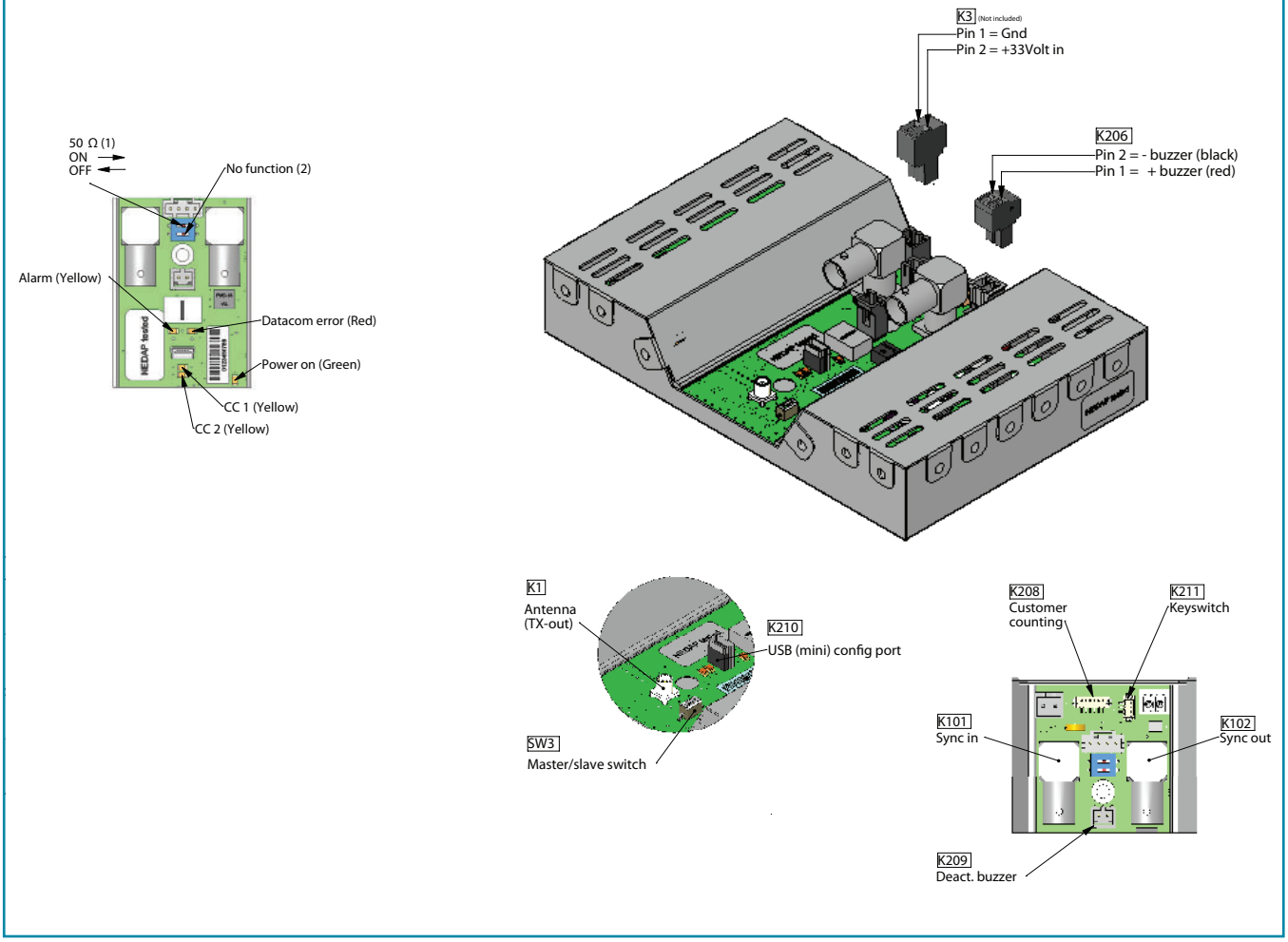
2.9 DC Power Supply

Power over synchronization is possible for X2. DC supply always from its own Master DC input connector K3 or from a power inserter .

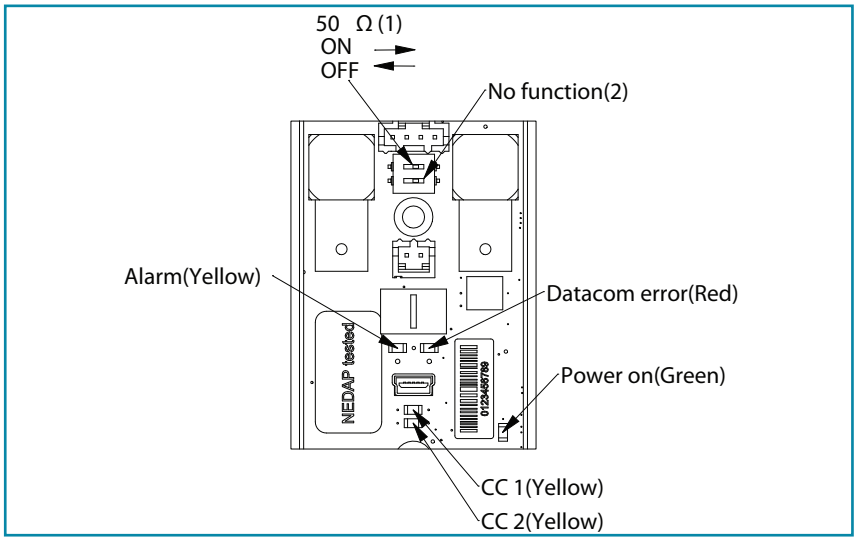


3. PCB Components overview

3.1 Connector overview



3.2 LED overview



4. Unit address

The X2 PCB has one network address. Be sure the correct Functionality Modules are installed

5. Connection to PC / Laptop

The X2 uses a min-usb connector for a direct connection with the Configuration Manager.

6. Configuration Manager

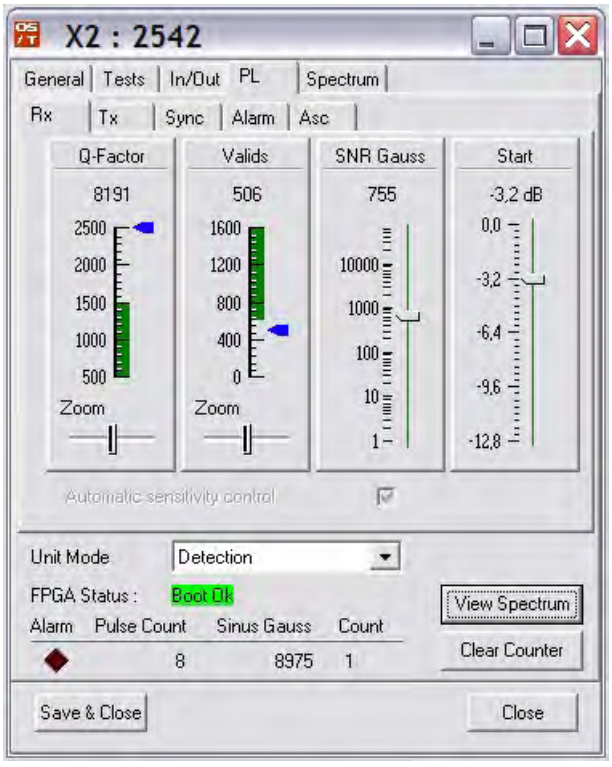
All real-time data displayed in the configuration manager, is a subset from the real data. The data communication is not showing all data, to limit the load on the data bus.

6.1 PL TAB

Below there are 4 real-time parameters, Alarm (red colored), Pulse Count, Sinus / Gauss and internal label detected counter. The alarm is indicating that the two blue markers are simultaneous in the green area, when the label is gone this alarm will immediately dim. The lamp on the antenna will be triggered by this signal but has a hold function. The channel and corresponding frequency will always give a predicted value of the center frequency of the label. When there is no label, it will predict it in the noise. This results in random changes.
The counter is an internal counter and independent from the counter used for easi/net. The counter has a reset button 'clear'.

During switching on the unit, the FPGA on board has to be booted. The FPGA status tells if this process succeeded.
A View Spectrum button will open another window with a real-time plot of the spectrum.
The button Save & Close saves all the control parameters into a flash and closes this window. During next boot, the new written control parameters will be loaded.

6.2 PL RX TAB



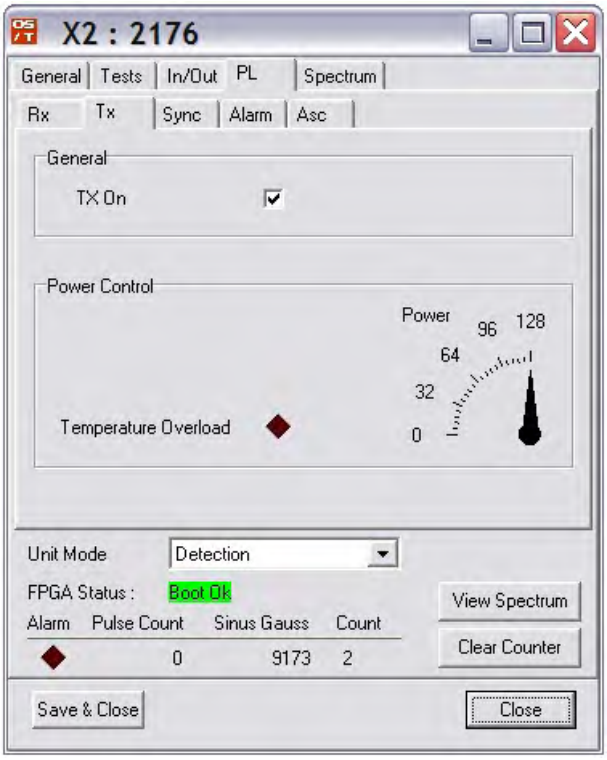
This is the main window that gives a quick overview of the system dynamics. There are two displays showing information of the actual Q and number of valids. In this display is a green colored range. This gives the threshold of the receiver for generating alarm. When both blue markers are simultaneous in the green area an alarm will be generated. The zoom control is centered at the max. value of the Q-factor and the min. value of the Valids.

The control SNR is automated in case Automatic Sensitivity Control (ASC) is allways activated. During booting of the unit, the environment of the antenna must be clean from labels.

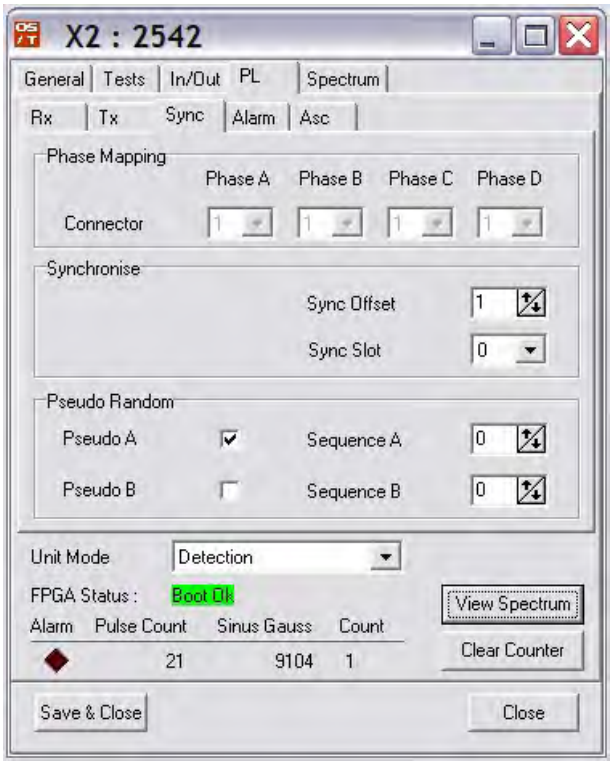
Start control is default set to a safe value (-3.2dB). This must be save for almost all situations. When the installation of all units is done and stable, you can test if the performance is ok. The performance can be tweaked to its highest level by changing the Start control to a lower loss value. The dB scale is indicating the expected sensitivity performance compared to the perfect situation with a label of Q=80. In situations of using labels with very low Q, it is giving the most boost. High Q labels benefit not so much from changing this control.

6.3 PL TX TAB

The transmitter can be switched on/off with TX On.
Temperature is monitored and the TX RF power is reduced or switched off when the temperature is above normal.
To prevent label from deactivating, a power control can be used. This control will reduce the RF power at the antenna when a label enters in its possible deactivation level. The Power meter indicates the actual power of the RF power amplifier, where 128 is max. power and 0 is min. power.



6.4 PL Sync TAB



When the unit is combined with other units, it needs to be synchronized. This can be switched on/off with unit synchronization (sync). With unit sync activated, the timing of all the units will be such that the have no/minimum interference from each other. The sync offset must be set depending on the connection to the NCC. When the unit is connected to the master NCC this offset is 0. When the unit is connected to the first slave NCC this offset must be set to 1, the second NCC to 2, third NCC to 3 etc. There are two sync slots 0 and 1. It is free to select a value. Between units with a different value one is 0 and the other 1, means they are 100% independent from each other even in an environment with very strong coupling between antennas at large distances.

Remark: When unit sync is active and no sync is connected, the buzzer and RF signal are switched off to prevent false alarms in this and other units. When Unit sync is activated but no sync signal is connected, the RED LED on the unit is on (D101). So RED LED D101 on? No RF TX signal and alarm are given.

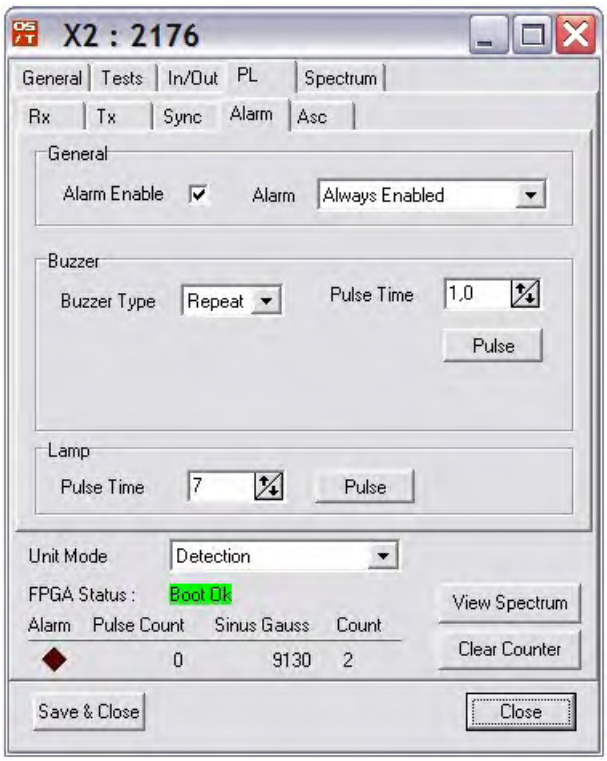
To synchronize the Nedap Retail sweep system with the X2 we need to set the correct active phase. When a Nedap swept system is synchronized with the X2, all mux settings on the sweep system must be set on 4. This gives phases A,B,C and D. When the sweep system is active in phase A and B the X2 must be switched to the other free phases C and D.

This product only supports a sweep system(s) connected to/configured as the master NCC.

In default setting, all phases are switched to active (value 1). If a swept system is configured to work on phase 1, the chameleon must have that phase inactive so value 0. In general when synchronizing a swept system with the chameleon, the phases must be inverted from each other.

Synchronization of Nedap sweep systems other then NCC MK2 (P2) are not supported.

6.5 PL Alarm TAB

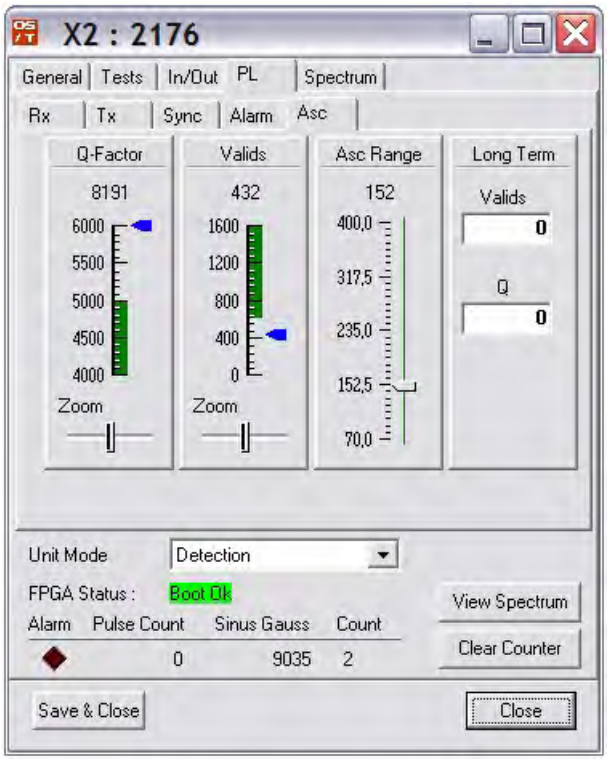


Alarm Enable is default active. When no lamp and buzzer signal must be given it must be switched off. Remember that when switched off, EASi/Net™ will NOT register events.

Buzzer mode: select between off, whine or continuous

Lamps Pulse mode: is the hold time of the lamp after label is not in the detection field

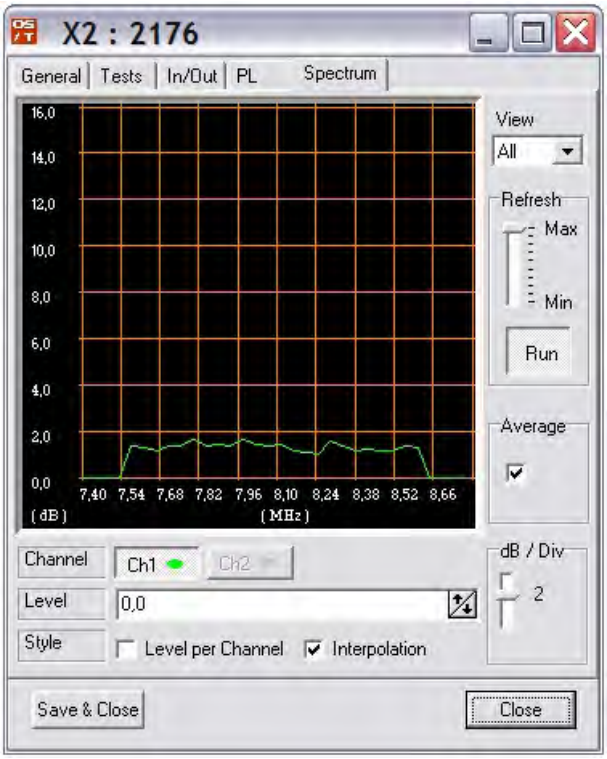
6.6 ASC



With the ASC Range, the sensitivity can be controlled. If there is a situation that less sensitive is wanted, the ASC range can be increased (larger number). To decrease (lower sensitive) the detection range default ASC=100.
Long term valids and log term Q give an indication in the stability of the unit in this environment. If both are 0 and stay 0, the unit function stable.

6.7 Spectrum analyzer

Using View Spectrum will open an extra window with a spectrum analyser. The same window can be selected with the TAB Spectrum.



This is a real-time spectrum analyser. On the horizontal axe is frequency (between 7.4MHz and 8.8MHz), and vertical is level relative given in dB.

The Level can be changed up/down. Scaling can be changed to zoom in and out. Average can be switched between quicker response but more noise to slower response but les noise.

At selection View are 3 choices of view types:

- All : show everything
- Gauss: only update plot when normal noise is detected
- Valid: only update plot when normal noise is detected and the correct signal to noise (SNR)

These 3 types give you the tools to determine what the spectral environment looks like. Is the environment clean, is there a carrier, is there a swept system or is there a pulse-listen system.

7. System configuration

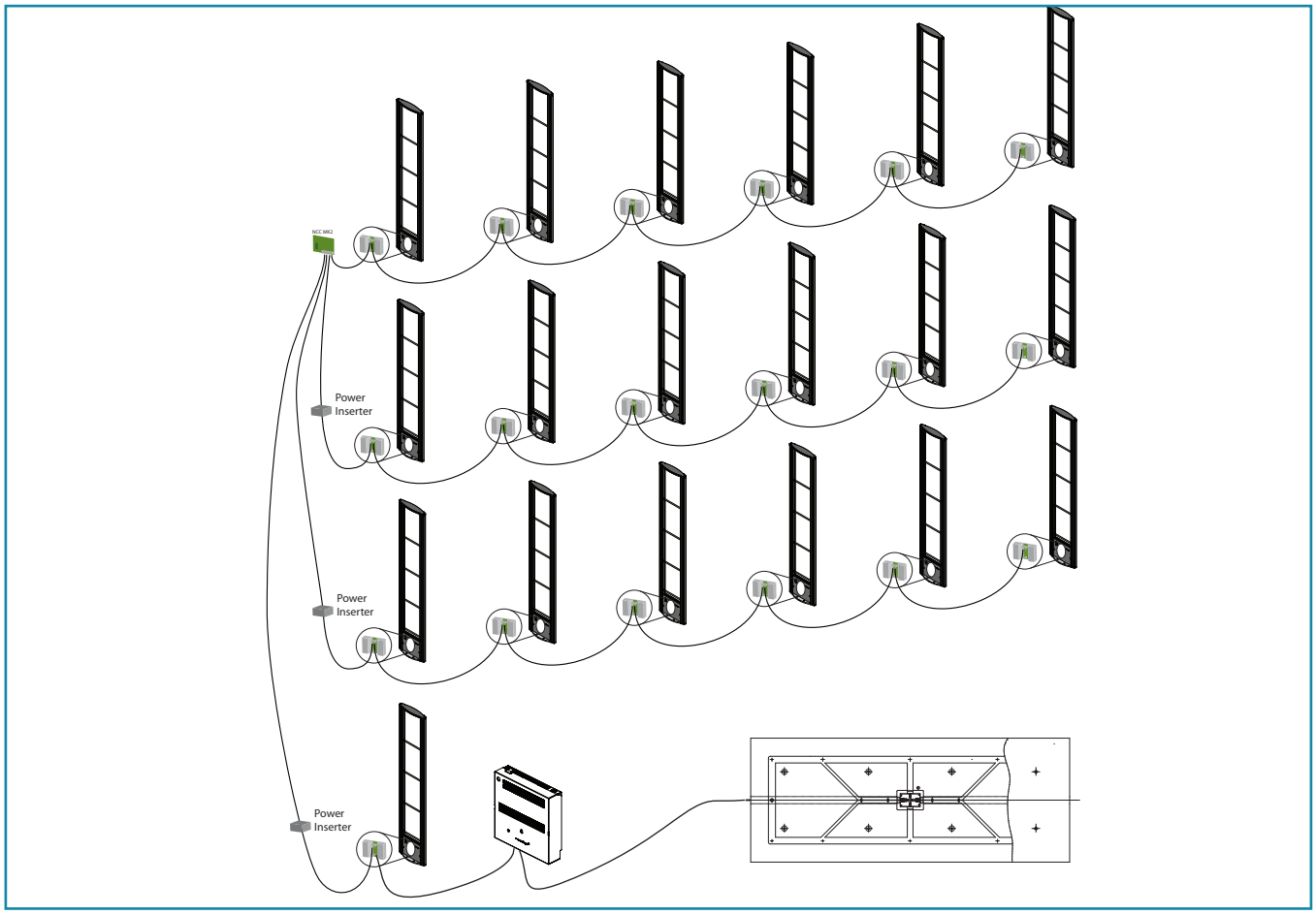
The new X2 electronics can be used as an internal in an antenna or external electronics. By use of an power inserter, 6 electronics can be connected.
An NCC MK2 can communicate with up to a maximum of 24 X2 electronics.

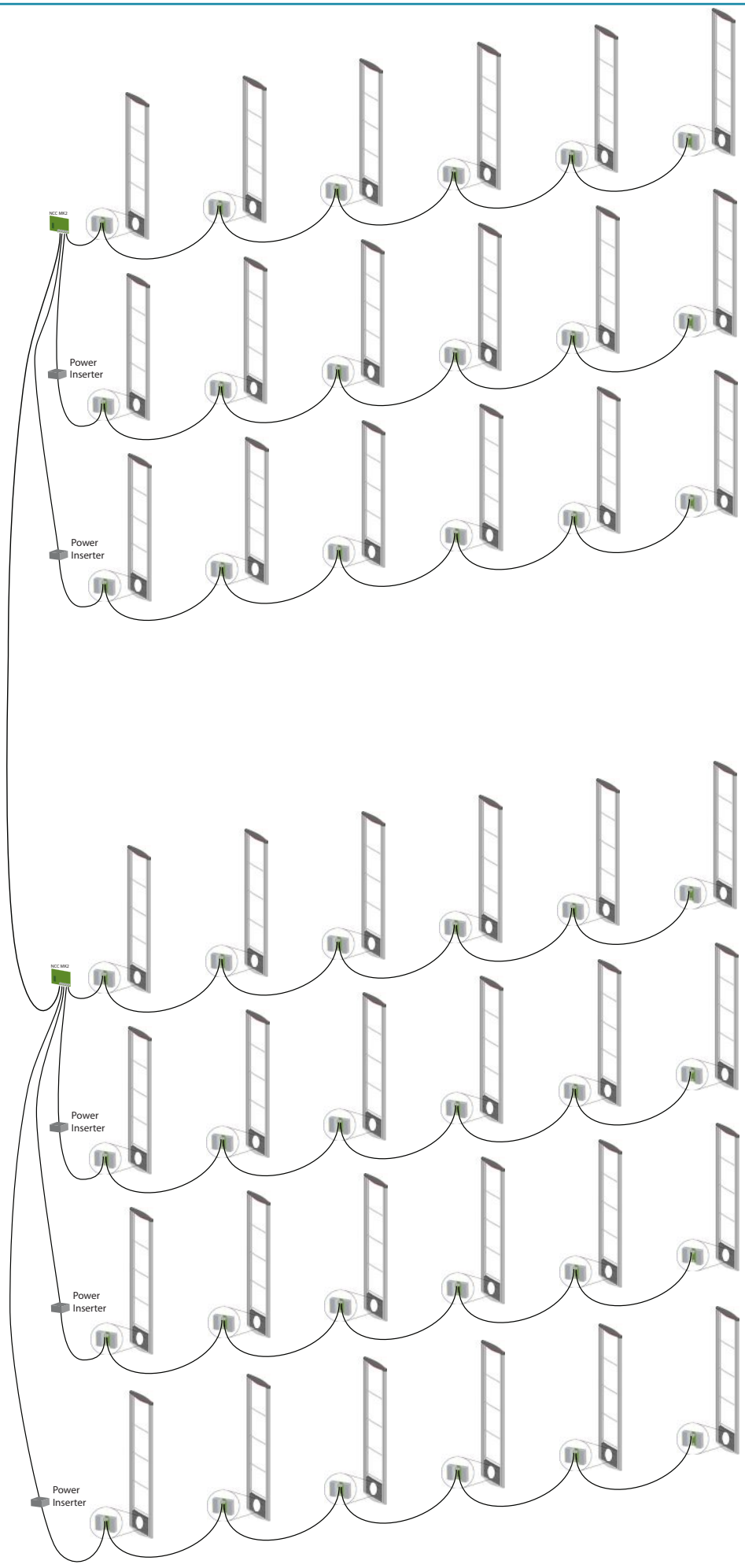
Table 1

Number of antennas	Non-connected systems	Connected systems
1 - 6	1 power inserter	1 NCC
7 - 12	1 NCC, 1 Power Inserter	same as non-connected, plus modem or LAN
13 - 18	1 NCC, 2 Power Inserters	same as non-connected, plus modem or LAN
19 - 24	1 NCC, 3 Power Inserters	same as non-connected, plus modem or LAN
25 - 30	2 NCC's, 3 Power Inserter	same as non-connected, plus modem or LAN
31 - 36	2 NCC's, 4 Power Inserters	same as non-connected, plus modem or LAN
37 - 42	2 NCC's, 5 Power Inserters	same as non-connected, plus modem or LAN
43 - 48	3 NCC's, 5 Power Inserters	same as non-connected, plus modem or LAN
49 - 54	3 NCC's, 6 Power Inserters	same as non-connected, plus modem or LAN
55 - 60	3 NCC's, 7 Power Inserters	same as non-connected, plus modem or LAN
61 - 66	4 NCC's, 7 Power Inserters	same as non-connected, plus modem or LAN
etc.	etc.	etc.

7.1 Medium scale installation example

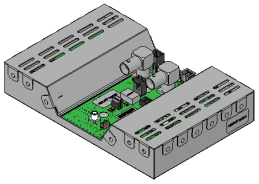
When using a 4 output NCC, a maximum of 24 PCB's can be connected. Below an example of a system with 19 antennas and 48 antennas.




NCC MK2
Power Inserter
Power Inserter
NCC MK2
Power Inserter
Power Inserter
Power Inserter

8. Specifications X2

Frequency	: 8.2 MHz
Antenna Connections	: 1x 50 Ohm BNC Transceiver connector
Synchronization	: 1x input 50 Ohm BNC 1x output 50 Ohm BNC
Weight	: 3 kg
Temperature range	: 0°C ...+40°C
Power Supply	: 30~33V DC, 400mA



Unit X2

Buzzer with cable

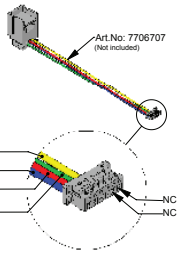
Cable 2 FR + MD

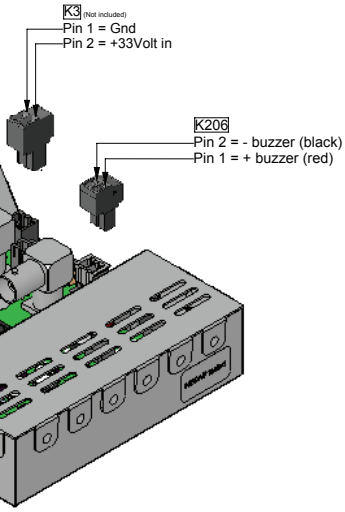
2x M3x10

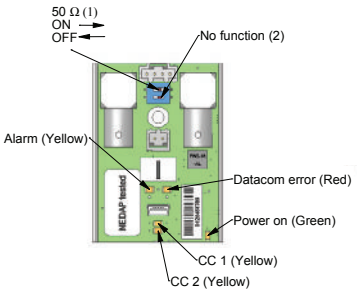
2x M3x6

2x M4x10

01

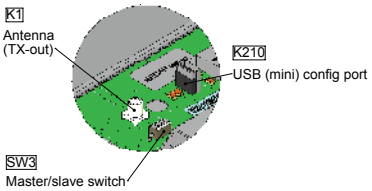


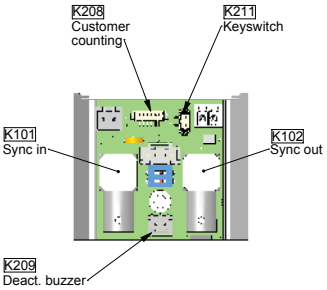




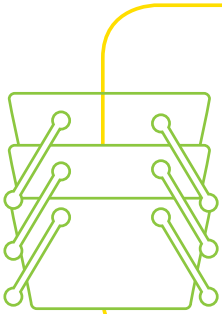
Unit Status (Slave or master)			
	Status LED's		
Button	Alarm (Yellow)	Datacom (Red)	Unit Status
press 1x (status available for 5 seconds)	Blink	Continuous	Slave
	Blink	Blink	Master

Change unit functionality			
After status check, press the button within 5 seconds to change functionality			
	Status LED's		
Button	Alarm (Yellow)	Datacom (Red)	Unit Status
press 1x	Status	Status	Status
press 2x (within 5 seconds) or press 2x (within 5 seconds)	Blink	Slave	Master
	Blink	Continious	Slave





nedap RETAIL — GROENLO - HOLLAND	DRW: CB 2011/03/09
	CHK:
DESCRIPTION: **QUICK REFERENCE X2** | art no. 8017328	DOC. ARTICLE NO: 5276659
	REV. : D
	SHEET: 45.01 OF 1
	DRAWING: T5276-659



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