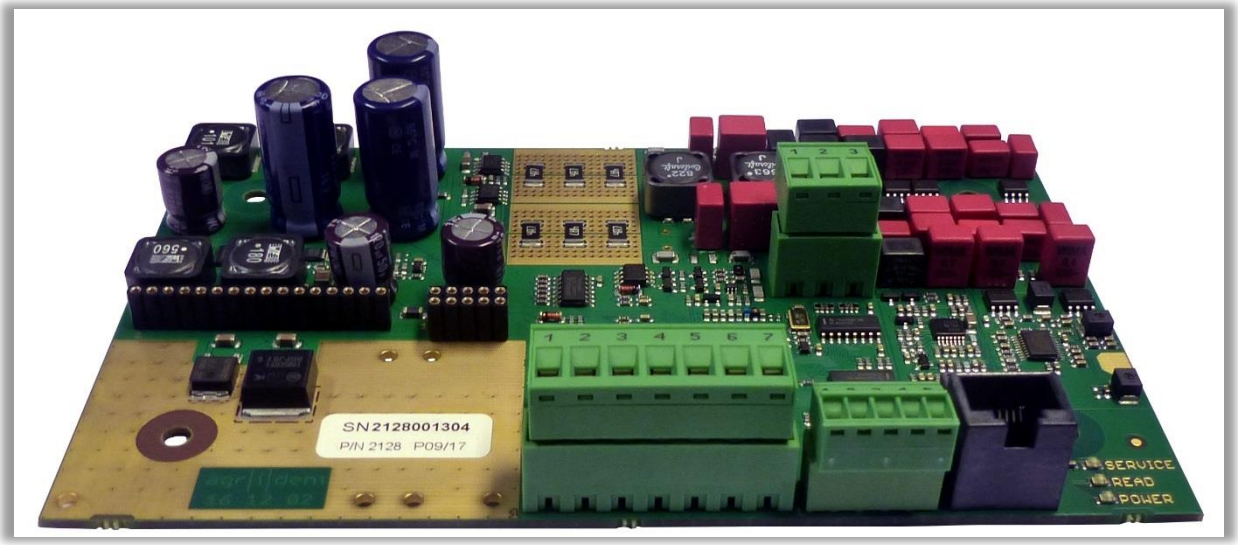
ASR650
Stationary Long-Range Reader



V19/09/18

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September 2018

Content

1 Introduction

This manual is primarily written for OEM customers, distributors and advanced users. It is not intended to be a document for end customers since there are lots of details explained which are much too technical for most end users.

Please read this manual carefully before using this product for the first time. It will help you to get the best possible system performance and to use all capabilities of the reader.

The equipment has to be installed by qualified personal only.

1.1 Definition of terms

Explanation of terms and abbreviations used in this manual

RF:	Radio Frequency (in this case the long-wave band)
RFID:	**R**adio **F**requency **ID**entification - A method of transmitting data contactless between a reader and transponders.
Reader:	A device which is able to communicate with transponders using an internal or external antenna. The reader generates a high frequency field in order to get the data of a transponder. The received data are transmitted to an external controller (e.g. PC) via an interface.
Transponder:	Data carrier for RFID applications, available in various models and types.
Raw data:	Complete data content of a transponder - that means ID and additional information (for example header or trailer).
ID:	Identification number of a transponder.
ISO 11784/85:	International standard concerning the use of RFID technology for the identification of animals; it defines the transponder types to be supported and the ID notation.
FDX:	Transponder type, which transmits its data while the RF field is activated (full duplex) using AM (Amplitude Modulation).
FDX-B:	FDX transponder with 128 bits of raw data, ID notation in compliance with ISO 11784/85.
HDX:	Transponder type, which transmits its data after RF field switches off (half duplex) using FSK (Frequency Shift Keying); 104 bits of raw data, ID notation in compliance with ISO 11784/85.

1.2 How RFID works

The items (here animals) to be identified are equipped with passive transponders, which contain an identification code. For energizing the transponders and for reading out the ID code, an RFID reader plus antenna is required.

The reader generates a high frequency field using an antenna. This high frequency field activates each transponder, which is inside the reading range. The high frequency field is used for supplying the transponder with energy and for transmitting the transponder data to the reader.

After receiving the complete transponder content, the reader decodes the ID and builds an ID message. This message is sent to an external controller for further processing.

The reading range depends on the output power, the antenna and the environment.

The following things may influence the reading range:

- Mounting antenna on metal or close to metal
- Antenna mistuned
- Electrical interference

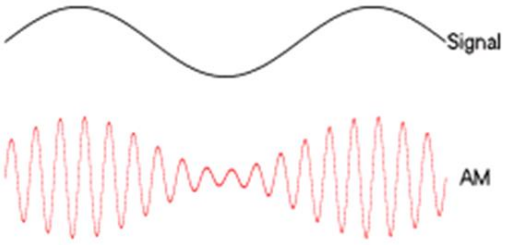
The *ASR Demo-Software* includes tools for checking the tuning state of the antenna and the environmental noise.

1.3 Supported transponder types

The ISO 11784/11785 supports two types of transponders: FDX-B and HDX. Both work completely different regarding the transmission of the ID code ('Modulation'). In both cases the transponder is energized while the RF-field is activated.

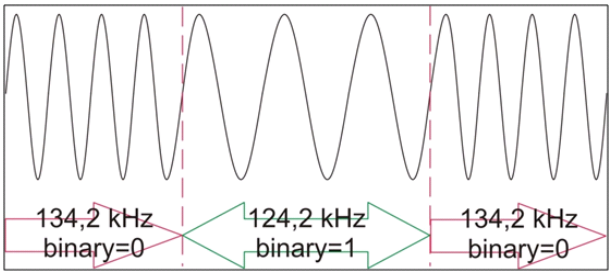
1.3.1 FDX-B

The transponder transmits its ID content while the RF-field is activated using Amplitude Modulation (AM). The envelope of the carrier represents the transponder data.



1.3.2 HDX

An HDX transponder transmits the information after the RF-field is switched off using Frequency Shift Keying (FSK). The higher frequency (134.2 KHz) represents a binary 0 and the lower frequency (124.2 KHz) the binary 1. The amplitude does not contain any information.



2 The Antenna

Allflex provides a range of different antenna options for the ASR650.

The antenna is one of the most important parts of an RFID system. It supplies the transponder with energy and receives the data transmitted from the transponder. There are several electrical parameters which are important in order to guarantee the best possible reading performance.

Please contact your local Allflex distributor regarding help for choosing the optimal antenna for your application. Selecting a wrong antenna size might decrease your systems performance unnecessarily. Please note that larger antennas do not always provide the best reading performance. A rule of thumb is: Choose the antenna as large as necessary but as small as possible!

Third Party Antennas

Allflex will not take responsibility for the correct function of the reader in case of using third party antennas. If the reader gets damaged because of connecting wrong antennas to it, the warranty becomes null and void!

2.1 Important notes regarding reading performance

In order to achieve the best possible performance with your ASR650, please consider the following rules carefully.

2.1.1 Antennas and metal

Installing the antenna on metal objects or close to them can decrease the reading performance seriously. The integrated Autotuning function of the reader is able to compensate parts of the negative influence of the metal. Metal normally decreases the antenna inductance. This can be adjusted by the reader by adding more capacitance to the antenna circuit. However, the losses in the metal cannot be compensated and reduce the reading range even if the antenna is tuned correctly.

So, it should be avoided to mount the antenna onto a solid metal plate or too close to a ‘short circuit ring’. The ‘*Tuning*’ tab in the *ASR-PC-Demo* Software can also provide useful information for checking the influence of metal on the system.

2.1.2 Antenna position regarding other electric equipment

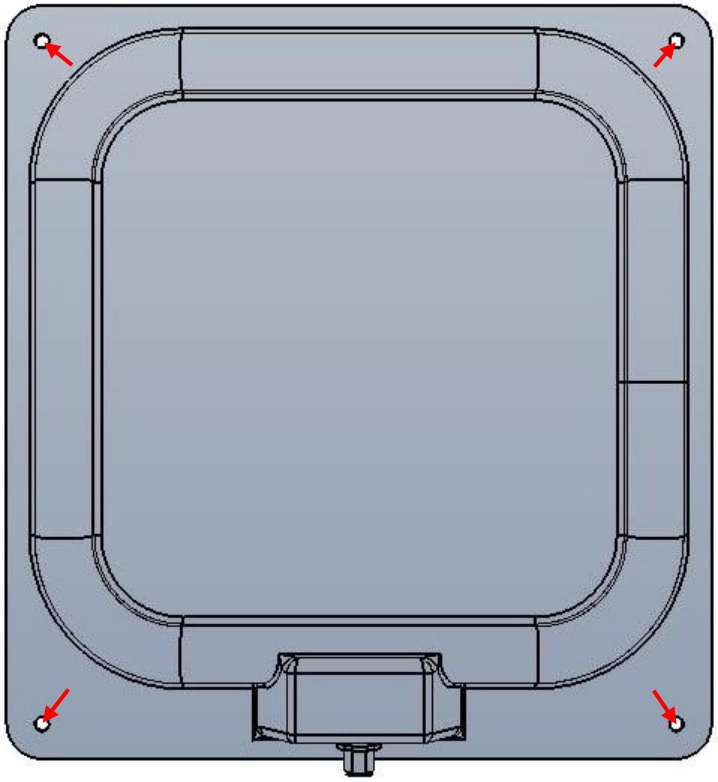
The antenna - as a fundamental part of the complete RFID system - also receives the transponder signals. These signals are very small since the transponders transmit passively. Although lots of other electric and electronic devices are not supposed to be radio devices, i.e. to transmit any signals over the air, they do that nonetheless. If these signals (or their harmonics) are within the frequency range of the RFID system, the reading performance may suffer.

In order to avoid a poor reading performance, the antenna should not be mounted too close to other electric or electronic devices, especially:

- switch mode power supplies
- frequency inverters
- motors
- CRT monitors
- energy saving lamps
- computers
- any other cables than the antenna cable (like mains, motor and interface cables)
- other LF-RFID systems within 50 meters, which are not synchronized

2.1.3 Installing the antenna

The following drawing shows the APA203 panel antenna.



For fastening the antenna on site, use flat head screws with a thread diameter not larger than 5 mm and suitable washers. Do not use countersunk screws for this purpose as this could lead to a damage of the plastic frame.

Please avoid exposing the antenna to direct sunlight permanently. Installing the antenna in an area sheltered from ultraviolet light will extend its durability.

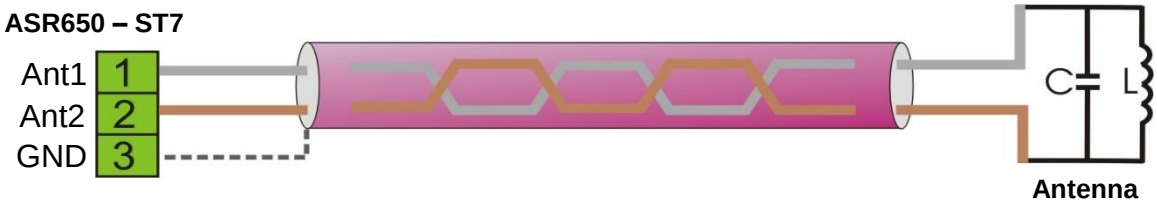
Please ensure that the antenna and the antenna cable do not interfere with movements of animals or persons close to the system. The antenna cable should be fastened with cable ties or it should be inside protective pipes. Please consider mechanically moving parts (like gates) very carefully. Do not fix cables where they can be stretched or damaged by animals.

2.1.4 Connecting the antenna to the reader board

The antenna has to be connected to ST7 of the reader board. The following table shows the correct wiring of the antenna for each type of antenna cable.

Pin Number	Function	Twinax Cable (black)	Chainflex cable (purple)
1	Antenna 1	silver	white
2	Antenna 2	copper	brown
3	Antenna Shield	black	black

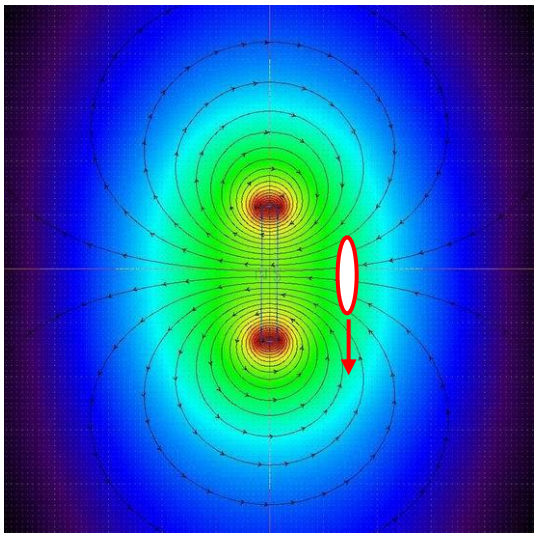
Allflex is only using these two types of antenna cable. If you are using third party antennas, the colors of the antenna cable wires might vary.

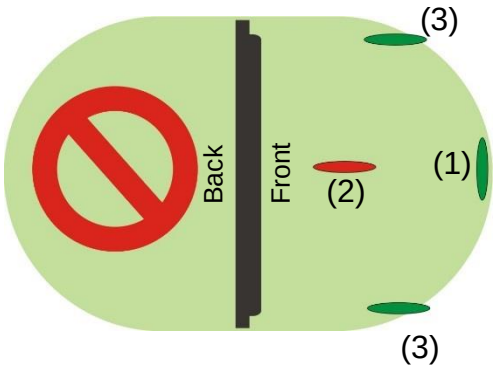


Allflex highly recommends to use low capacitance antenna cable (twisted), like TWINAX AWG 2x20 (IBM Nr. 7632211) or IGUS Chainflex CFBUS.LB.021 (very flexible, also at low temperatures but more expensive).

2.1.5 Field Distribution

1. Single Antenna



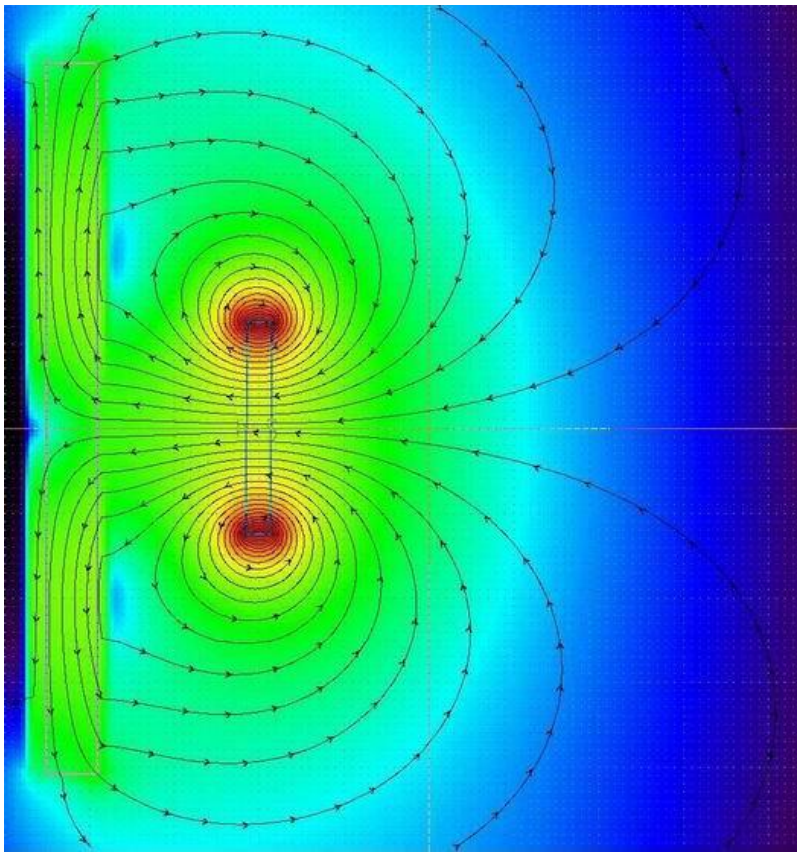


The left picture shows the field distribution and lines of flux for a single antenna. This leads to **optimum** and **worst** reading orientations. Generally speaking, the transponder coil should be in 90 degrees to the field lines in order to achieve the best reading range.

In case of a single antenna, an ear tag has to be parallel (1) to the middle of the antenna panel for the maximum read range – a glass tag / bolus perpendicular. If the ear tag is rotated by 90 degrees off the optimum orientation (2), it cannot be read in the same position. But it can be read at the sides of the antenna in this orientation (3) at about 60-70 percent of the reading range from case (1).

It is important to prevent animals / tags from entering the back zone of the antenna. Animal ISO 11784/11785 does not support Anti-Collision like used in HF- or UHF readers. That means, if two or more transponders of the same type – either FDX-B or HDX – are in the antenna field at the same time, they cannot be read since they are transmitting at the same time. It is not possible to direct the magnetic field into one direction only, so mechanical means may be required.

Shielding the antenna on one side is only possible within certain limits. Placing the antenna on a metal plate directly will short-circuit the field into both directions. The antenna requires a certain distance to the metal plate in order to avoid a complete loss of reading performance into the other direction. The distance depends on the antenna size. For the APA206, for example, the antenna should have at least 10 centimeter clearance from the metal plate. For larger antennas the distance has to be higher.



This graph shows the field distribution of a single loop antenna close to magnetically conducting material. You can see that the field is deformed compared to the case without metal.

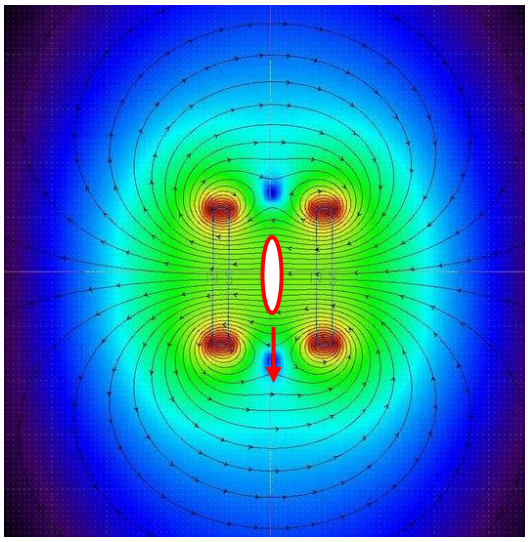
It is important that the metal plate has at least twice the size of the antenna coil in order to allow good shielding. The material of the plate can be stainless steel, for example.

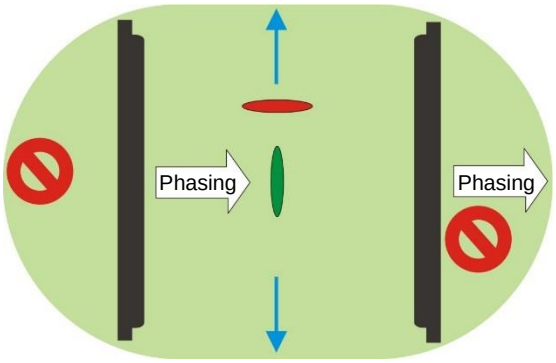
Such a setup will prevent tags from being read behind the shielding metal plate. It is also imaginable to take advantage of this fact for preventing antennas, which are close together, from coupling, e.g. in multi-lane applications.

2. Double Antenna

The ASR650 offers the possibility to connect two single panels to one reader. In order to make this possible, you require a double antenna adapter (‘*ASB200*’). The panels are normally arranged in parallel orientation and face each other in order to build one common field. Comparable to magnets, the single fields of the antennas can attract or repel each other, depending on their phasing.

Antennas in phase:

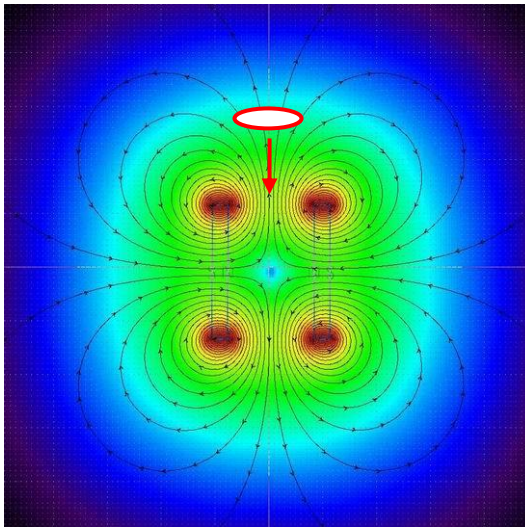


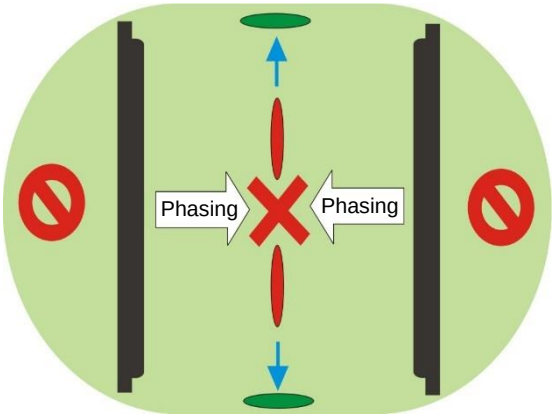


In this setup the antennas are “in phase”. This is also called parallel- or Helmholtz antenna. The optimum tag orientation is similar to the one of the single antenna (transponder coil parallel to the panels). The reading distance can be significantly increased compared to a single antenna. In addition, it does not matter on which side of the animal the ear tag is attached since the tag is close to any of both panels.

Please avoid very close distances between both antennas! Since the coupling of the two coils can be too high in such a case, the reader might not be able to tune the antenna correctly anymore. For two APA206 antennas in this setup, the panels should have a minimum distance of 50 centimeters.

Antennas out of phase





In this setup the antennas are ‘out of phase’. This is also called anti-parallel- or Anti-Helmholtz antenna. The optimum tag orientation is 90 degrees rotated compared to those of the single antenna and ‘double antenna - in phase’ setup.

As you can see in the left drawing, the direction of the field lines varies at different positions. This makes the anti-parallel setup more suitable for applications with varying transponder orientations than the other setups.

Nevertheless, this setup has disadvantages as well: There is a dead spot in the middle of the gate. At this point the tag cannot be read in any orientation. How large this zone is, depends on antenna size and distance. Please avoid mounting the antennas in positions, where the animals’ transponder stays in this dead spot. For pure walkthrough applications this fact does not really matter because the tag should be read without stopping the animal (before and after this spot). But for applications where animals should be read when they are stopped, e.g. in a scale, it should be considered carefully.

Additionally, the field is pretty much ‘pushed’ outside the gate – like for magnets with equal polarity. This extends the reading zone in a way that transponders can be read quite far outside the panels as well. That could lead to several transponders in the field at the same time and thus to data collision – so the reading zone should be checked out doing comprehensive tests before starting with live animals.

An advantage of the anti-parallel setup is the suppression of far-field interference. This can be an interesting aspect if long-wave transmitters decrease the reading performance.

2.1.6 Antenna requirements

Basically, the nominal antenna inductance is about 13µH and the capacitance approximately 105nF. When the inductance is lower, more capacitance is required and vice versa.

Based on the transmit power level which is selected, the ASR650 requires a minimum antenna impedance. The antenna impedance (parallel impedance) correlates with the Q-factor of the antenna. The lower the Q, the lower the antenna impedance.

Power Level	1	2	3	4	5	6
Power in %	1	30	50	70	90	100
No Antenna	1400	1400	1400	1400	1400	1400
High Imp. [Ω]	1200	1200	1200	1200	1200	1200
Low Imp. [Ω]	0	200	200	250	500	750
Short circuit	0	200	200	200	200	200

The line '*Low Imp. [Ω]*' shows the minimum antenna impedance required for operating the ASR650 within the according power level. At full transmit power, the minimum impedance is 750Ω. When the antenna impedance is lower, the reader will disable the transmitter in order to protect some components from damage due to overheating.

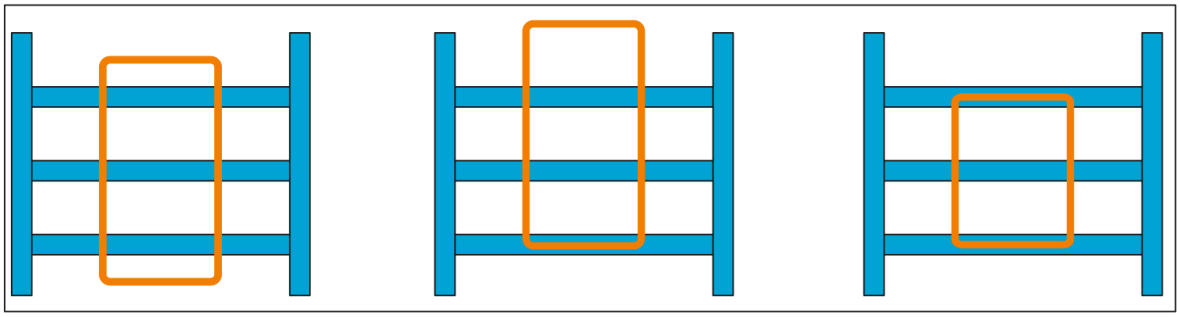
A low antenna impedance results from a low antenna Q. In case of using Allflex antennas, the values for the impedances are high enough. But when the antenna is too close to metal, the impedance decreases as well. In this case please check your installation and try to mount the antenna at a different position. It might also be required, to remove some metal parts. If this is not possible, the power level has to be reduced until the impedance is sufficient. But the lower the power level, the lower the read range.

The status '*High Impedance*' and also '*No Antenna*' do not result in the switch-off of the transmitter. They are just shown for informational purposes when requesting the antenna status. If the impedance is too high, it could be possible that the transponder reception does not work any longer because the bandwidth of the antenna is too narrow then.

The transmitter power level can be changed in the tab '*TX/RX*' in *ASR-PC-Demo*. Please see chapter 4.8.2 for details.

2.1.7 Antenna and metal bars

Generally, it is the best if there is no metal close to the antennas used in LF-RFID systems. If metal cannot be avoided, there are certain rules to consider. This document shows some examples for placing the antenna on steel bars, which is probably a quite common scenario. The location of the antenna is important and the different setups result in different performances of the system.

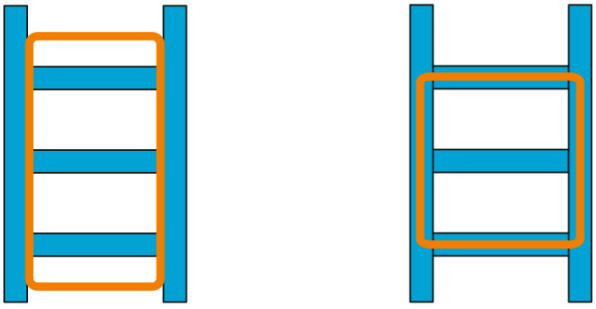


(1) (2) (3)

(1) This is the best possible installation when steel bars are present. The horizontal parts of the antenna coil are well away from the metal as well as the vertical parts. The vertical parts cross the horizontal bars only at small sections so that losses are reduced to an acceptable minimum.

(2) In this setup the antenna was shifted upwards so that the lower horizontal part of the coil is directly at the position of a metal bar. This setup is worse compared to (1) and it will introduce higher losses that will result in lower reading performance.

(3) The installation shown here will introduce even more losses because now the upper and lower horizontal parts of the coil have the same position as the steel bars.



(4) (5)

(4) Here the horizontal parts of the coil are okay again but the vertical parts are too close to the vertical steel bars. This setup will also lead to a poor reading performance.

(5) This is the worst possible setup. The coil is ‘touching’ the bars completely.

It is highly recommended first to provisionally fix the antenna and to check the antenna parameters using *ASR-PC-Demo*. This can be done using cable ties, for example. After confirming that the antenna values are good enough for allowing the optimal system performance, the antenna should be fixed permanently. Please also refer to chapter 4.7 for details.

3 The Reader Electronics

ESD precautions must be taken while touching the reader board after it has been removed from its antistatic bag. Ignoring this warning will lead to the loss of warranty.

The ASR650 is a stationary reader designed for reading both ISO relevant transponder technologies: FDX-B and HDX. It is operating on 134.2kHz and can read passive tags as defined in ISO11784/11785 at a very good reading range. Combined with one of our antennas, the ASR650 provides a flexible and universal RFID system.

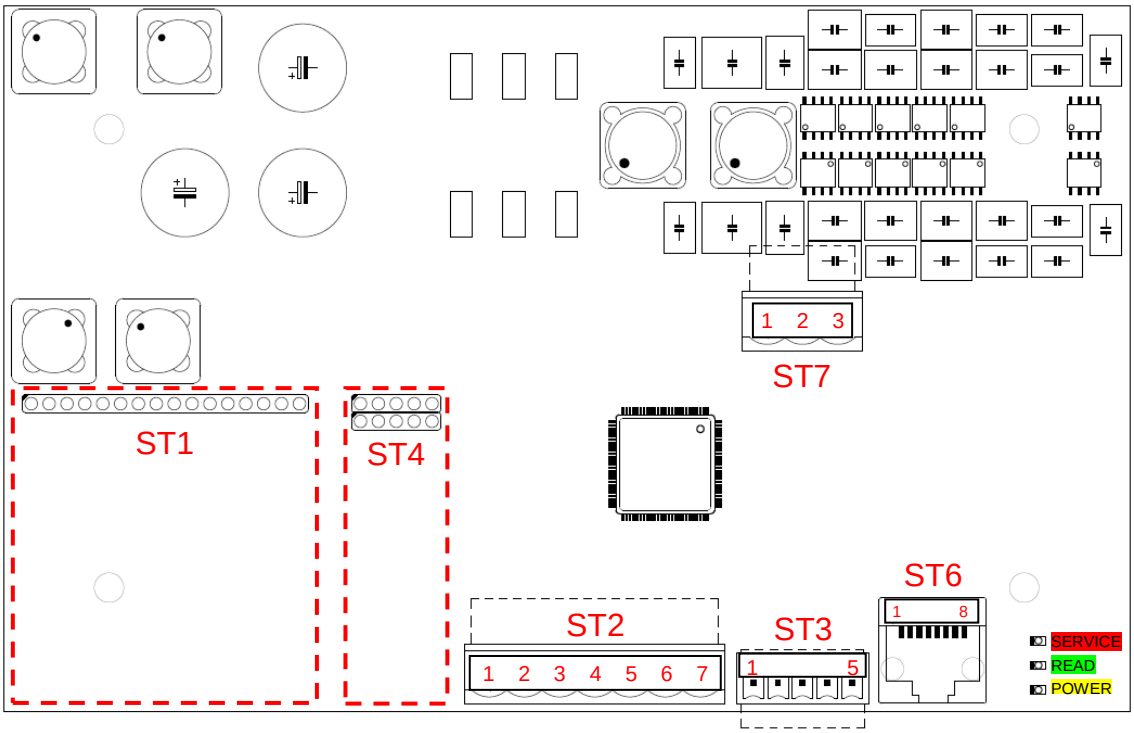
The reader board consists of the power supply, the transmitter (including patented Autotuning function), two separate receivers (for FDX-B and for HDX), a microcontroller, two communication interfaces (RS232 and RS485) and an interface for connecting a four- or eight channel antenna multiplexer. The ASR650 additionally offers an interface for add-on modules like Bluetooth, WLAN, Ethernet or the two-channel antenna multiplexer. The optional wired Synchronization module can be attached to another connection strip.

3.1 Specifications

Power Supply	12V (3A) DC to 24V (1.5A) DC (+/- 5%)
Operating Frequency	134.2kHz
Reading Range	HDX: up to 70cm FDX-B: up to 65cm with antenna APA203
Reading Rate	HDX: up to 14 reads per second FDX-B: up to 18 reads per second
Antenna Tuning	Patented Autotuning (USP 6, 070, 803 and EP 0 625 832 B1)
Interfaces	RS232 and RS485 (8N1, configurable from 9600 Baud to 115200 Baud) Optional: ■ Bluetooth Class 1 (Master capable) or ■ Ethernet
Indicators	Onboard LEDs: ■ Yellow: Power ■ Green: Tag Read ■ Red: Malfunction (antenna tuning or low input voltage) Optional: External LED board with buzzer
Synchronization	Wireless Synchronization for HDX only Wired Synchronization optional
Antenna values	Inductance = 13µH, Capacitance = 105nF, >750Ω impedance at full transmit power (can be less when transmitter power is lower), see chapter 2.1.6.
Temperature	Operating Temperature: 0-60°C Storing Temperature: -20-70°C
Dimensions	L x W x H: 160 x 100 x 30mm

3.2 Installing and Connecting the ASR650

The following picture shows the ASR650 circuit board:



Connector	Function
ST1	Socket for Add-On Module (Bluetooth, Ethernet or 2-channel MUX)
ST2	Connector for DC power supply and RS232 / RS485 interface
ST3	Connector for 4-channel or 8-channel MUX
ST4	Socket for Wired Sync. Module
ST6	Connector for external LED board (RJ45)
ST7	Antenna connector

Since the Add-On Modules do only fit in one direction, the pin assignments do not need to be explained in detail.

The ASR650 uses the 'Phoenix Combicon' series for the antenna-, power supply- and interface connectors. The reader board comes with the corresponding mating plugs which have screw terminals for connecting all the cables. The wiring has to be done as follows:

3.2.1 ST2 – Connector for DC power supply and interface

Pin Number	Function
1	V+ (12.0 …24V DC), 36W
2	V-
3	RS232 TxD
4	RS232 RxD
5	GND (is not the same as V- !)
6	RS485-A
7	RS485-B

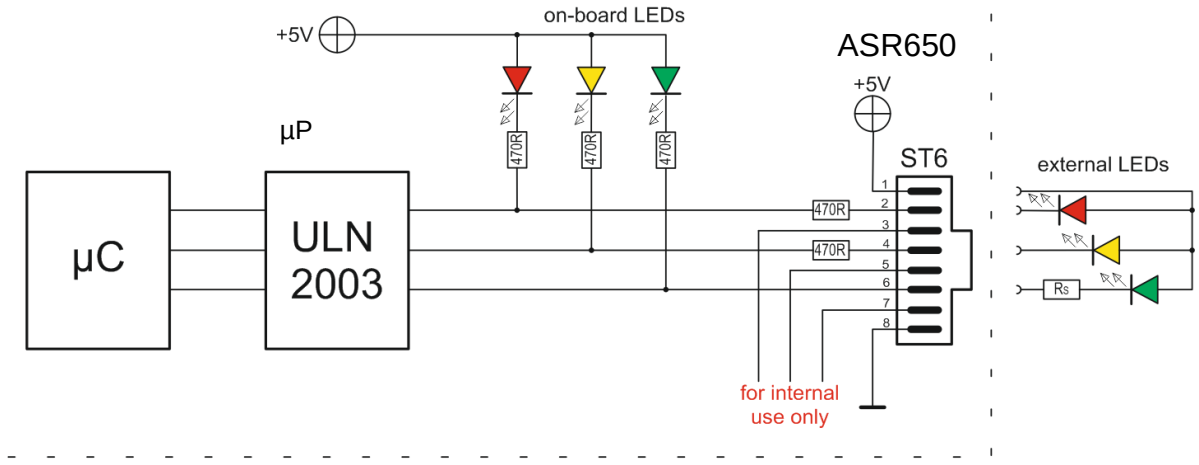
3.2.2 ST7 – Antenna Connector

Pin Number	Function
1	Antenna 1
2	Antenna 2
3	Antenna Shield

3.2.3 ST6 – Connector for external LED Board

The ASR650 provides an RJ45 plug for connecting an external LED board. You can also purchase an external LED board from Allflex, which contains an additional buzzer for audible indication of a successful tag read.

Pin	Function
1	+5V (common anode)
2	Red LED cathode
3	For internal use only!
4	Yellow LED cathode
5	For internal use only!
6	Green LED cathode
7	For internal use only!
8	GND



The external LEDs have the same functions as the on-board LEDs. Please note that there are series resistors for the red and yellow external LEDs on the reader board already but not for the green LED. Hence the series resistor for the external green LED must be added externally. It is important to pay attention on the electrical values of the LEDs and ULN2003.

Please do not use pins 3, 5 and 7 – these are only used for internal purposes on the ASR650! Pin 8 (Ground) is not needed for connecting external LEDs, as shown in the schematic above.

3.2.4 ST3 – Connector for 4/8-channel antenna multiplexer

Unlike for the ASR550, there is no additional adapter board required for connecting a 4-channel or 8-channel antenna multiplexer. The electronics and the connector are on the ASR650 already. Via the connector ST3, the multiplexers are supplied with power and it also provides the required control lines for switching the antennas.

Pin Number	Function
1	Power supply for MUX
2	Control line A
3	Control line B
4	Control line C
5	GND

The control lines are also used for detecting the MUX-type during the initialization period – so please always connect all of them. The wiring to the external multiplexer boards is 1:1. There is no special cable required here but the connection between reader and multiplexer should be kept as short as possible.

3.3 Signalization

The ASR650 has three on-board LEDs which indicate the reader status. In general, the yellow LED indicates that the reader is switched on and the Firmware is running, the green LED indicates a successful tag read and the red LED means that there is a fault condition. The table below lists the possible indications related to the operating conditions:

Yellow (Power)	Green (Read)	Red (Service)	Function
continuously on	off	off	Reader status OK
continuously on	flashing	off	Tag was read
flashing	off	off	Reader is OK and Sync. Slave
flashing	off	continuously on	Low input voltage (<11.0V DC)
continuously on	flashing	continuously on	Antenna fault

Condition one, two and three indicate that the reader is working properly. If the input voltage is below 11.0 Volts DC, the reader will shut down the transmitter in order to avoid overheating. The ASR650 will also disable the transmitter if the antenna inductance and / or the antenna impedance are completely wrong. The antenna requirements are explained in chapter 2.1.6.

3.4 Power Supply Requirements

You might use power supplies between 12 and 24 Volts DC for the ASR650. It is very important that these power supplies have low ripple and noise (50mV$_{PeakPeak}$ or less). Allflex highly recommends using linear regulated power supplies (stabilized). Switch-Mode power supplies can decrease the reading performance significantly if their switching frequency is too close to the readers operating frequency. In addition, they change their behavior depending on input voltage and load. You can also operate the reader from a 12 Volt car battery but please note that the ASR650 will disable the transmitter if the input voltage sinks below 11.0 Volts.

The power supply should be able to deliver 3 Ampere per reader at 12 Volt DC since the maximum input current can be 2 Ampere. For higher input voltages the required currents are smaller.

Regarding the minimum input voltage, it is also very important to consider the length and the cross-section of the power supply cable.

Let's assume the output voltage of your power supply unit (PSU) is 12.0 Volts and you want to use standard data cable with a cross-section of 0.5mm². The minimum input voltage for the reader is 11.0 Volts and the maximum possible current about 2 Ampere. So, the maximum allowed voltage drop is 1.0 Volt and thus the maximum allowed cable resistance is 0.5 Ω.

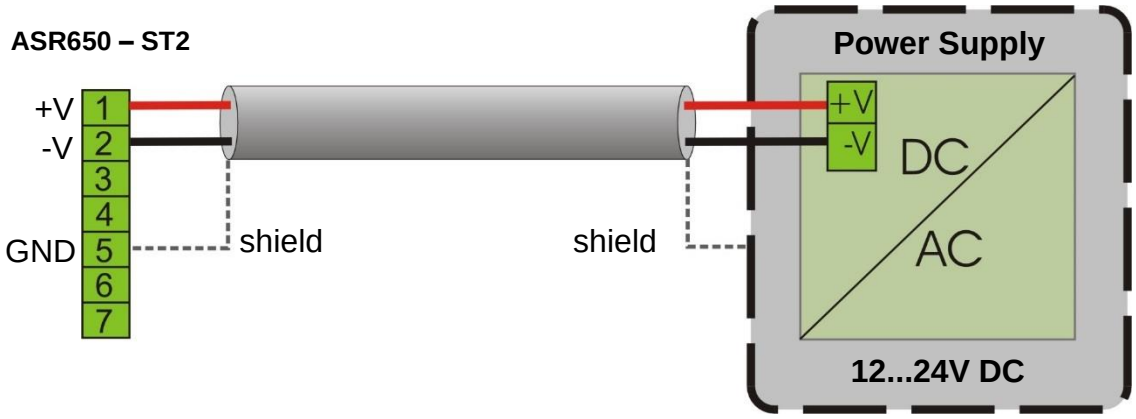
V_{PSU} = 12.0V $V_{In\ Minimum}$ = 11.0V cable: 0.5² with 36mΩ / meter I_{Max} = 2.0A

$$l_{Max} = \frac{(V_{PSU} - V_{In}) \div I_{Max}}{2 \times 0{,}036\ \Omega/\text{meter}} = \frac{(12.0V - 11.0V) \div 2.0A}{2 \times 0{,}036\ \Omega/\text{meter}} = \frac{0.5\ \Omega}{0{,}072\ \Omega/\text{meter}} = 6{,}94m$$

That means your power supply cable must be shorter than 6.94 meter in this case. If the cable needs to be longer, you have to use cable with a higher cross-section or a PSU with a higher output voltage.

For the most agricultural applications, standard non-shielded cable will work fine. However, there might be applications where shielded cable is required, e.g. Abattoirs or other industrial applications. In this case the shielding avoids the reception of unwanted signals via the power supply cable – at least partially.

You should connect the shield to Ground of the reader (ST2-Pin5) on one end and on the other end to the enclosure of the power supply in case of using a metal enclosure.



The minimum cross-section of the power supply cable should be 0.5mm².

3.5 The RS232 Interface

One of the several possible interfaces of the ASR650 reader is the RS232. Although it might be a little bit old-fashioned in the consumer-electronic market meanwhile (lots of computers do not even have such an interface anymore), it is still used in agricultural applications very often. One of the major advantages compared to USB is that the RS232 does not require drivers to be installed manually.

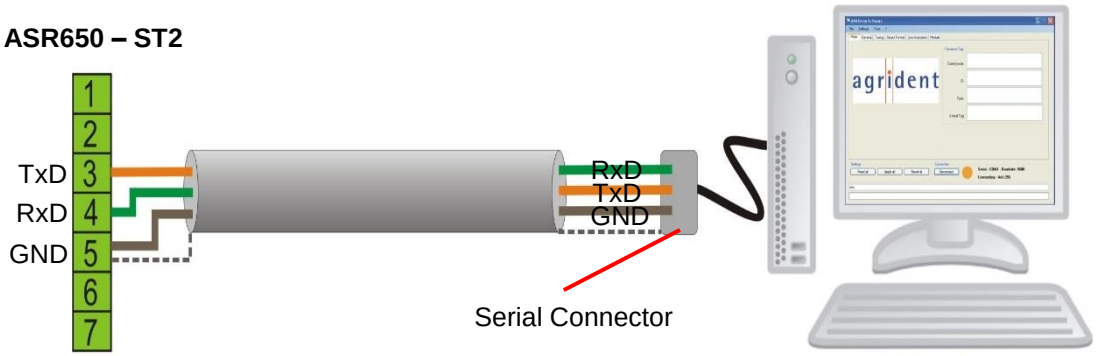
An RS232 interface needs at least three wires: TxD, RxD and GND.

TxD: the line on which a device transmits data
RxD: the line on which a device receives data
GND: Ground (as reference to TxD and RxD)

In order to use the RS232 interface, connect all three lines to the host device. Please note that the RxD and TxD lines have to be crossed. The line on which the ASR650 transmits data is the line on which the host receives data and vice versa.

For connecting the RS232 of the reader to a 9-pole D-SUB connector, please use the following wiring:

ASR550 – ST2	Connection	PC SUB-D 9 pole
Pin 3 - TxD	———	Pin 2 RxD
Pin 4 - RxD	———	Pin 3 TxD
Pin 5 - GND	———	Pin 5 GND



Please do not forget to connect the Ground line as this builds the reference for RxD and TxD. The "–V" Pin (ST5-Pin2) is not the same as Ground! The RS232 will not work properly without connecting Ground.

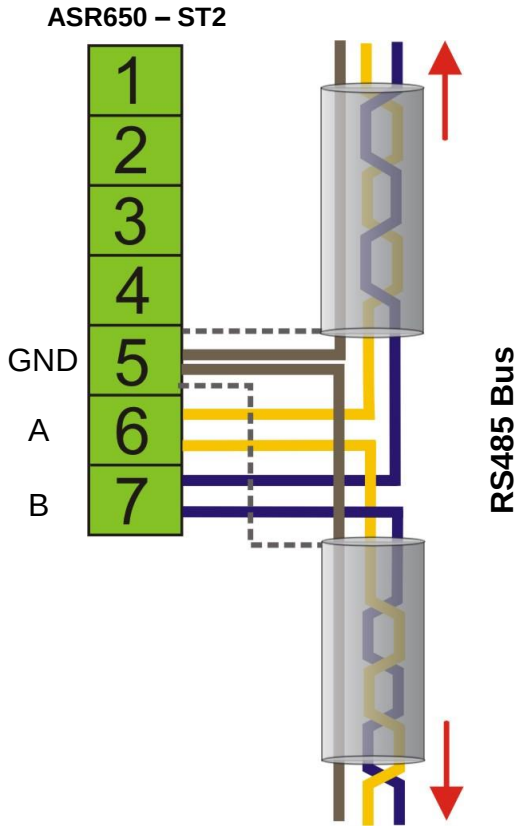
In addition, you always have to connect both lines: RxD and TxD – even if you do not want to send data to the reader. The reason is that the ASR650 uses an RS232 circuit which disables itself, if it does not detect valid RS232 signals.

The maximum allowed cable length for RS232 is 12 meters according to the RS232 specification. This is because the maximum allowed cable capacitance at 19200 Baud is 2500pF. Using low capacitance cable might allow longer cables but please keep in mind that the critical cable length gets smaller as the baud rate is rising!

The RS232 baud rate is configurable between 9600 and 115200 baud. You have to ensure that both ends are using the same settings; otherwise the communication will not work at all.

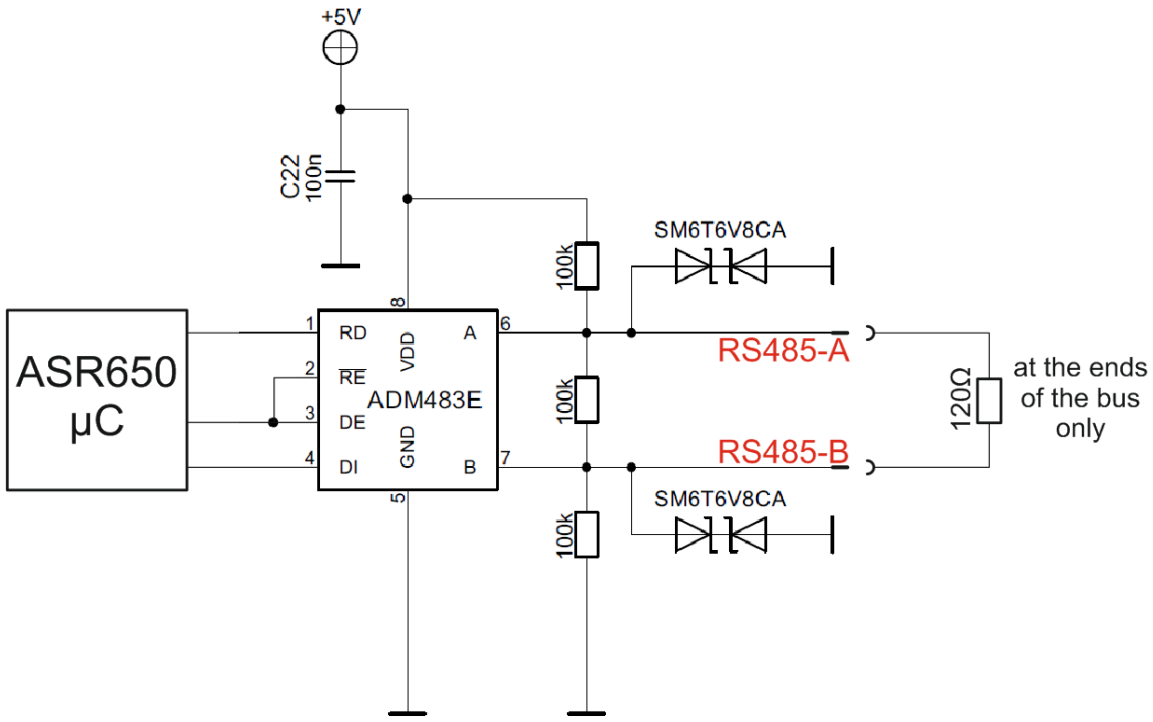
3.6 The RS485 Interface

EIA-485, also known as *RS-485,* is a standard defining the electrical characteristics of drivers and receivers for use in balanced digital multipoint systems. Digital communications networks implementing the EIA-485 standard can be used over long distances of up to 1200 meters. It should also be used in electrically noisy environments because the symmetrical signal transmission suppresses interference. Multiple receivers may be connected to such a network in a daisy chain configuration. Please use low capacitance twisted pair cable, like CAT5 Ethernet cable, for the RS485 wiring only. A and B should be connected to one twisted pair. Although an RS485 signal has no ground reference, GND should be connected as well. Over long distances there can be significant differences in the voltage level of 'Ground'. RS-485 networks can typically maintain correct data with a difference of -7 to +12 Volts. If the Grounds differ more than that amount, data will be lost and often the port itself will be damaged. The function of the signal Ground wire is to tie the signal Ground of each of the nodes to one common Ground.



The maximum number of devices on the bus is 32. The recommended arrangement of the wires is a connected series of point-to-point (multi-dropped) nodes, a line or bus, not a star or a ring.

The two ends of the cable should have a termination resistor connected across the two wires. Without termination resistors, reflections of fast driver edges can cause multiple data edges that can cause data corruption. The value of each termination resistor should be equal to the cable impedance (typically 120 Ω for twisted pairs).



The above drawing shows the RS485 schematic of the ASR650 including the fail-safe resistors and protection diodes. The resistors are necessary for biasing the lines to known voltages and nodes will not interpret the noise from undriven lines as actual data.

The RS485 baud rate can be configured from 9600 to 115200 baud. Please ensure that all nodes use the same and correct setting.

It is very important that each device on the bus uses a different network- or node address. If several readers are using the same address, data collision might be the result. You can change the reader's node addresses via the *ASR-PC-Demo* Software.

4 ASR650 Settings

In order to allow the ASR650 to work in a wide range of applications, there are lots of possibilities for changing the behavior of the reader, i.e. for altering several settings. Therefore, Allflex provides a software which is available for free. You may also control the reader with own software or change settings using the corresponding commands according to the ASR650 protocol. Please see the ASR650 protocol description for details.

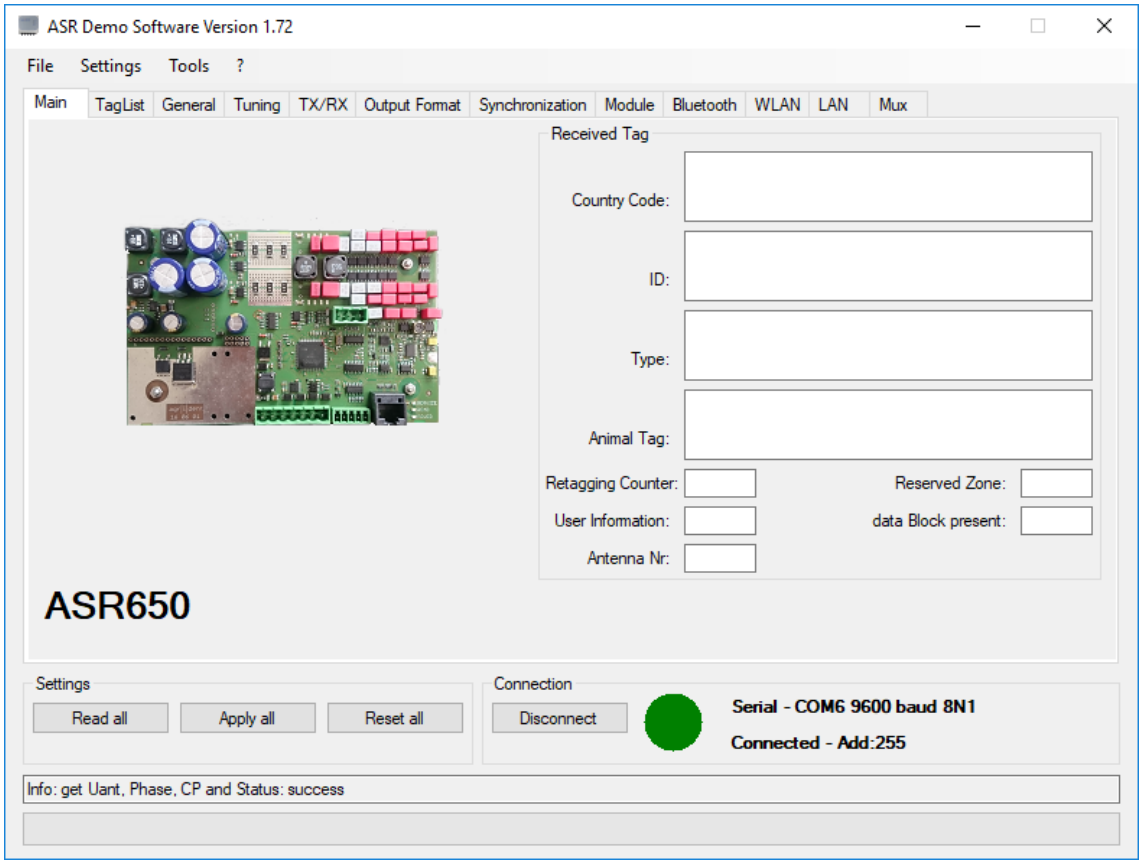
All the different reader settings will be explained in combination with the *ASR-PC-Demo* software for stationary readers in the following chapters as well as the comprehensive diagnostic capabilities.

4.1 Installing *ASR-PC-Demo*

Please start the setup file and follow the instructions in order to install the software.

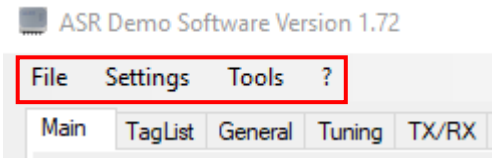
ASR-PC-Demo is written in Visual Studio and requires the Microsoft .NET Framework Version 3.5 or higher.

4.2 Starting the *ASR-PC-Demo*



After starting the software, the main screen appears as shown above.

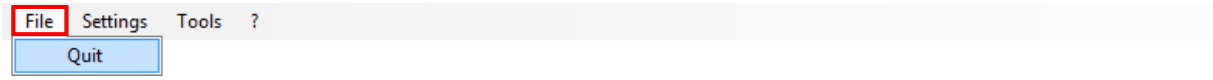
4.3 The File Menu



The file menu is located in the upper left corner of the main window. It consists of the menu items '*File*', '*Settings'*, '*Tools'* and '*?*'.

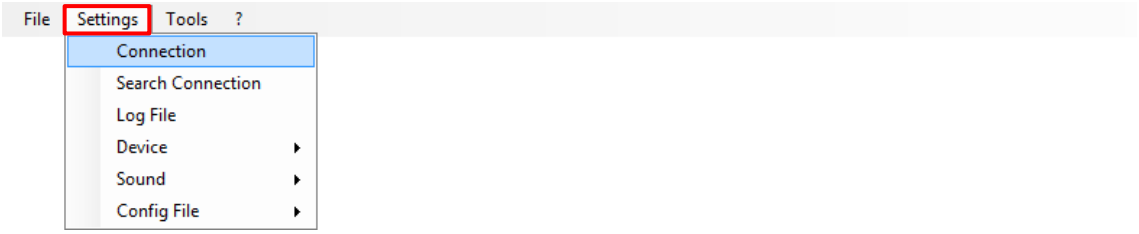
4.3.1 File

The Menu '*File*' contains only one menu item: '*Quit*'. This item closes the software. Alternatively, you might also close the program using the corresponding 'X' button in the upper right corner of the main window.



4.3.2 Settings

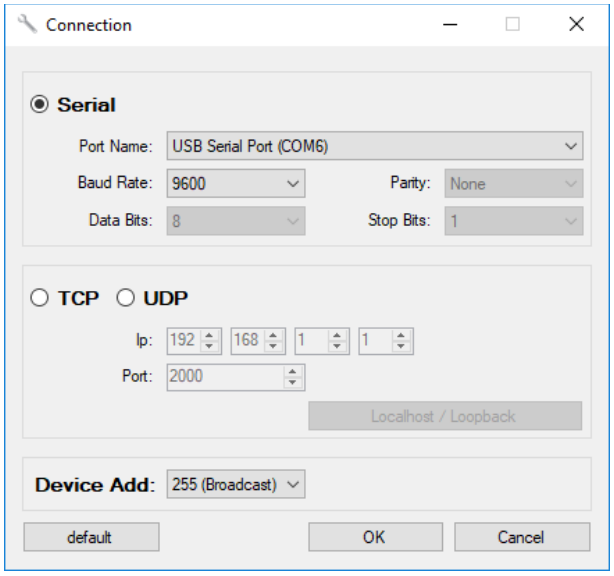
The menu '*Settings*' contains the menu items shown below.



These items will be explained in the next subsections.

4.3.2.1 Connection

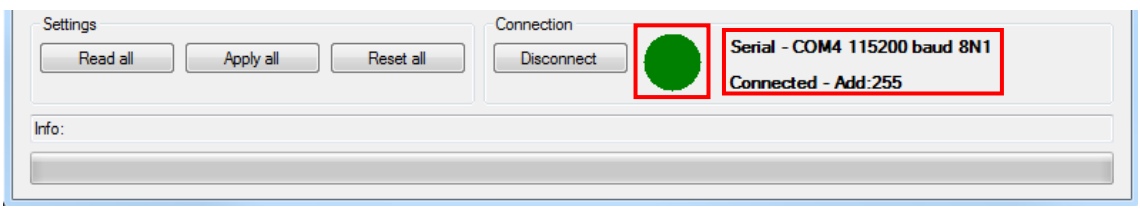
If you press '*Connection*' an additional window opens. Here you have to select the interface type and the corresponding settings.



In case of using the readers RS232 or RS485 interface or the optional Bluetooth Module, the connection type to be used is '*Serial*'. This also applies to all kind of USB-Serial-Converters like an USB-RS232 Converter.

Please select the correct '*Port Name*' and the correct '*Baud Rate*'. The baud rate is configurable between 9600 and 115200 baud. The configured baud rate of the ASR650 has to match with the selected baud rate in the software – otherwise the communication will not work. Per factory default, the ASR650s baud rate is set to 9600.

If the connection was established successfully, the orange circle in the main screen will turn into green. In addition, you can see the currently selected port, baud rate, and the network address, *ASR-PC-Demo* is using for communicating with the reader.



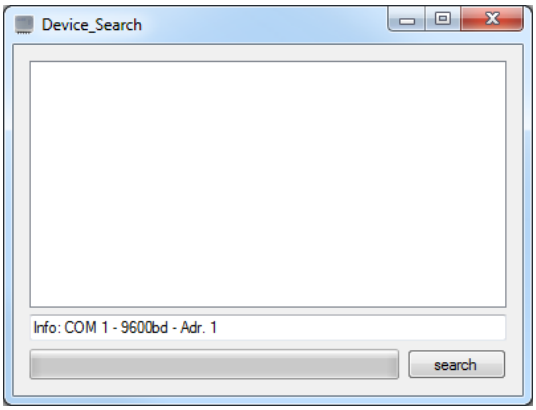
The default network address is 255 (FF in hexadecimal) which means, all readers listening on this port will answer requests. Different network addresses make only sense in case of having several readers connected to one RS485 interface.

Please keep in mind that each comport can only be accessed by one program. If you want to use other software for communicating with the reader, please close *ASR PC-Demo* before or at least click on '*Disconnect*' in the main window.

TCP/IP connections are only intended to be used if your ASR650 has an optional WLAN – or Ethernet module. Please see the corresponding manuals regarding details about the TCP/IP configuration.

4.3.2.2 Search Connection

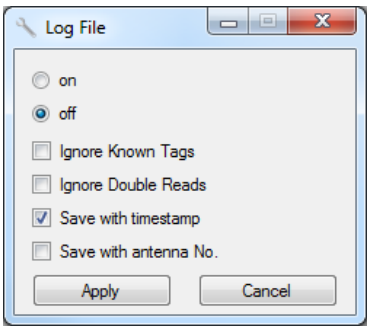
In case the correct port name or the baud rate are unknown, this menu item can help. It starts a scan for compatible devices on all available ports and with all possible baud rates. As soon as a device was found, the window shows the device type and on which port the reader was found with a particular baud rate. Click on '*search*' in order to start the scan. Depending on how many ports are available on the system, the search might take a while.



When the device of interest was found, the scan maybe aborted by clicking on '*cancel*'. By double-clicking on the device, the connection will be opened with the parameters which were found to be correct.

4.3.2.3 Log File

If you press '*Log File*', a small window opens:



Here you can decide whether the *ASR-PC-Demo* should create a log file containing the read transponder numbers or not. If the option '*on*' is selected, the program will create a new log file in the *ASR PC-Demo* folder each time you start the software. The option '*off*' effects that no log file will be created. If you decide to save a log file, you also have the possibility to select particular options that will be explained further.

Ignore Known Tags

When this box is checked, the software will ignore all tags which have already been read since the program was started.

Ignore Double Reads

If the reader transmits one and the same ID again and again, it will be written into the log file only once if this checkbox is activated. If a different ID is read meanwhile, the previous ID will be added to the log again next time it is read. So '*Double Reads*' only refers to ONE transponder number being read repeatedly.

Save with timestamp

In case the timestamp should be added to the log file as well, this option has to be checked. The software will add the system time to each ID that was received.

Save with antenna No.

When using an antenna multiplexer, it will probably be interesting to log on which antenna channel the ID was received. When this checkbox is activated, *ASR-PC-Demo* will save the antenna number for each ID.

4.3.2.4 Device

This submenu allows choosing the reader product you are using. If the software was connected to an Allflex Stationary Reader successfully, the reader type should be detected automatically. Anyway, 'older' reader models are supported as well. It makes sense to select the device manually if you want to evaluate diagnosis data 'offline'", i.e. with no reader connected. The ASR650 saves the diagnosis data (also tuning curves) different from the previous models like the ASR400, ASR500, ASR600 and ASR700. When diagnosis data should be evaluated without having a reader connected, please ensure that you select the correct reader model here – otherwise the data will not be shown correctly.

4.3.2.5 Sound

ASR-PC-Demo can play a sound via the PC speakers each time a tag is received. This option can be disabled and enabled here.

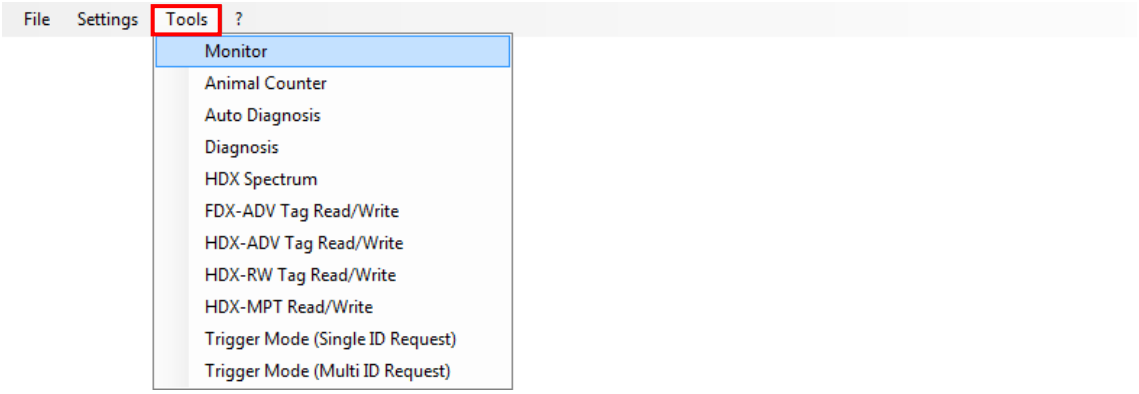
4.3.2.6 Config File

When several readers are used and they should always have the same configuration, it does make sense to create a file containing the complete reader settings in order to be able to re-load it for applying the settings to several other readers as well.

Modify the settings that should differ from the factory default settings once. Then select '*save file*' in order to write the configuration to a file on your computer. Connect another reader and click on '*load file*' in order to copy the settings from the file into *ASR-PC-Demo*. Please note that the settings are not sent to the reader at this point. In order to configure the reader accordingly, it is necessary to press the '*Apply all*' button. You may check if the configuration has been sent correctly by clicking on '*Read all*'. The complete reader configuration will be requested from the reader and the settings in the software are updated accordingly.

4.3.3 Tools

The section Tools contains the submenus shown below.

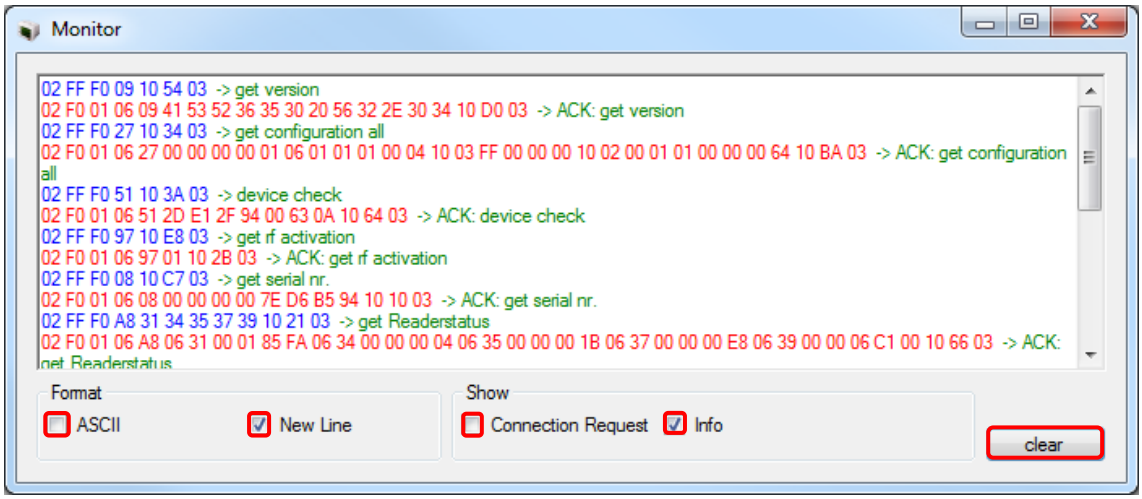


The functions '*FDX-ADV Tag Read/Write*', '*FDX-ADV Tag Read/Write*', '*HDX-RW Tag Read /Write*' and '*HDX-MPT Tag Read/Write*' are related to transponders that are not compliant with ISO11784/11785; hence these items are not explained in this manual but in separate documents.

'*Diagnosis*' and '*HDX Spectrum*' are related to the **IDF** (**I**ntegrated **D**iagnosis **F**unction) of the readers. In combination with *ASR-PC-Demo* it is possible to sample and record signals from the devices receivers, such as 'noise', the transponder signals or a mix of both. The records can also be opened on other computers and played again, so that they are shown as they have been recorded. These tools are very helpful for trouble shooting problems with the reading performance but they also require quiet some background knowledge. For this reason, these features won't be explained in this manual but in further documentation.

4.3.3.1 Monitor

The Monitor window shows the complete serial communication between the reader and the PC. This is very useful for software developers in order to verify communication in their own software with the telegrams the *ASR-PC-Demo* software is sending and receiving.

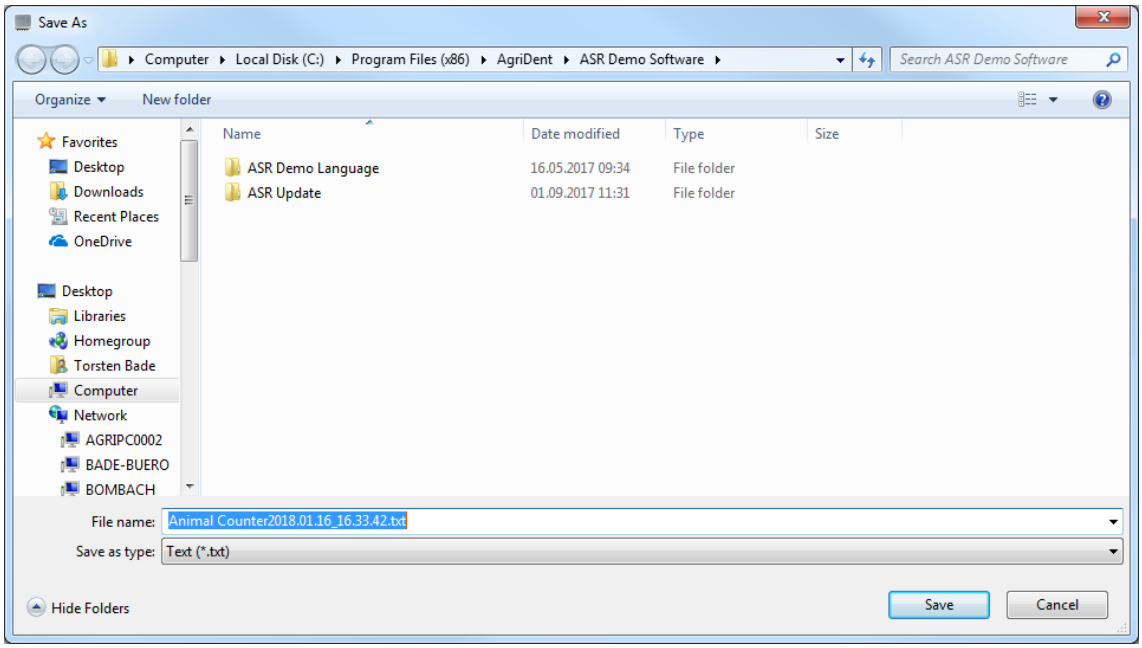


The communication might also be watched in ASCII format. This makes more sense for viewing the transponder data in output formats which do not use the transmission frame, like the '*Short ASCII*' formats, '*NLIS*', '*ISO24631*' or the '*Custom Format*'. The button '*clear*' empties the window. When '*New Line*' is checked, the monitor window will insert a line break after each telegram. *ASR-PC-Demo* sends connection requests to the connected device periodically in order to check whether the reader is still connected or not. However, this can be bothering when it is required to evaluate particular telegrams. Therefore, the connection requests can be excluded from the shown communication in the monitor window, even though they are still sent. For further information, please refer to the ASR650 protocol description.

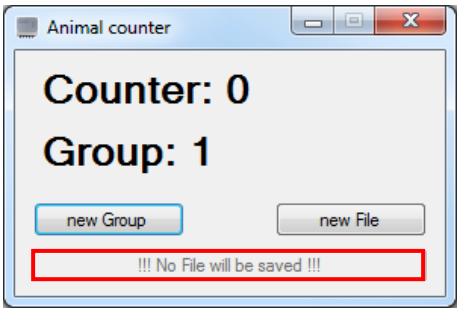
4.3.3.2 Animal Counter

The Animal Counter works similar to the already mentioned log file with the option '*Ignore Known Tags*' activated. Nevertheless, there are some differences. This function can be used for test and demonstration purposes.

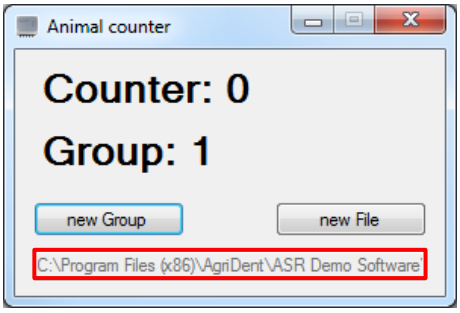
When you click on this menu item, a 'Save File' dialog will open first.



Please choose a folder where you want to save the file containing the read transponder numbers to. The file will be saved as a text file with the default name '*Animal Counter*' followed by date and time. You might also change this default name, of course.

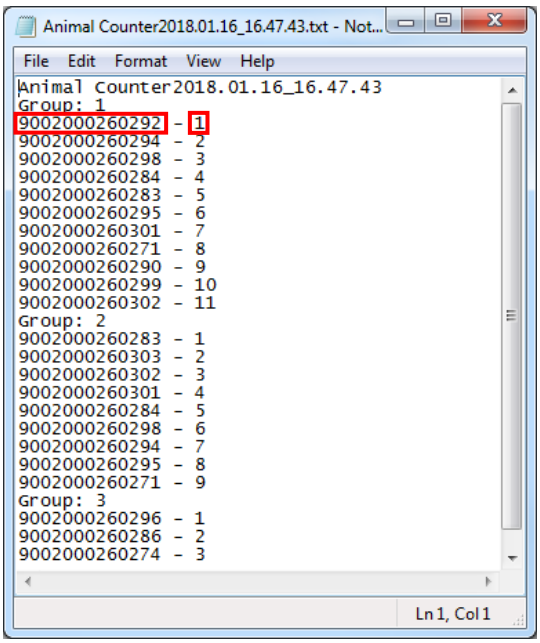


If you pressed '*Cancel*', the Animal Counter is started anyway but no file will be saved. This information is also displayed in the Animal Counter window.



If you decided to save a file, the path will be displayed. When you are reading transponders now, the counter is increased as soon as a new, unknown, tag has been read. In addition, all new IDs will be written into the corresponding text file.

You may also insert a '*new Group*' separator. As a result, the Animal Counter will be reset to '0' and transponders which were already read in previous groups will be counted again. New Files may also be created from here.



When you open the Animal Counter file with a text editor like notepad, the file should look similar to the example on the left.

Within the particular groups you can see the EID first and then the counter value within the current group.

In this example there are three groups. An ID listed in Group 1, cannot appear in this group again. But it can appear again in the next group because a new group was created and hence the buffer for checking for known tags was reset.

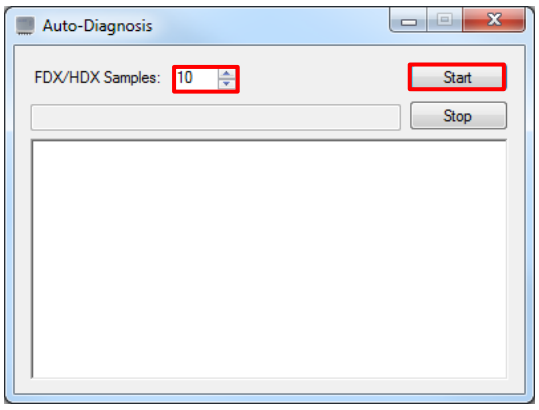
4.3.3.3 Auto Diagnosis

There are generally two possible reasons for a decreased reading performance:

1. Wrong antenna tuning, maybe even in combination with too much metal close to the antenna.

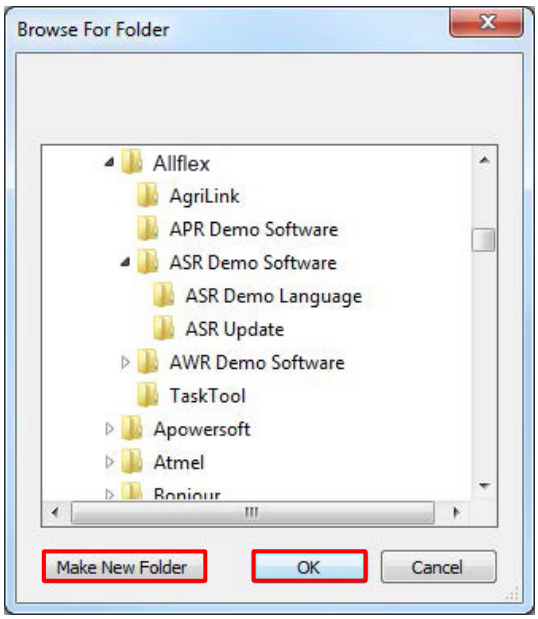
2. Electromagnetic interference – often referred to as 'noise'.

The ASR650 provides powerful diagnosis features for evaluating both, antenna status and noise levels. However, since these features might not be that easy to use 'manually' for non-experts, there is a simple way for getting all these data – the '*Auto Diagnosis*'. It stores a complete tuning curve and the noise levels for both receivers, FDX and HDX. In addition, reader configuration and reader status are requested. All these data are intended to be sent to technical staff for further evaluation.

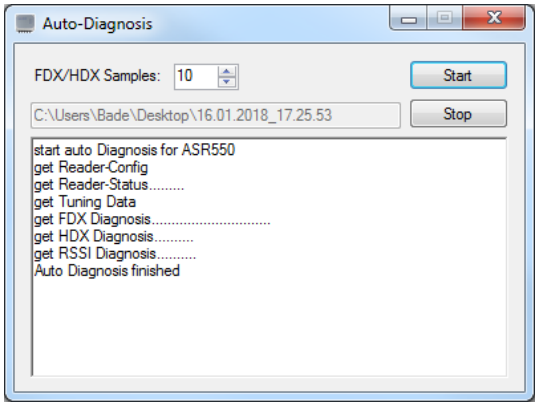


When clicking on '*Auto Diagnosis*' a new window will appear.

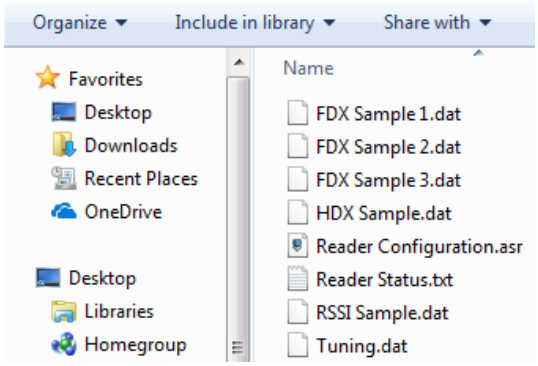
Per default, the Demo Software will request 10 of each samples – FDX, HDX (RSSI) and the HDX frequency. Since noise is not static usually, it always makes sense to save more than one sample per channel. You can press start in order to continue or first increase or decrease the number of samples.



After you have pressed '*Start*', a '*Browse for Folder*' dialog opens. Here you can select a destination path for the diagnosis data. You also have the possibility to create a new folder.



The Demo Software will now request a complete tuning curve and the selected number of diagnosis samples plus configuration and status information. The data will be saved in the folder you have selected previously. You can now navigate to that folder and send the complete diagnosis data to the technical staff. You may also pack the files using *WinZip*, *WinRar* or a similar program.



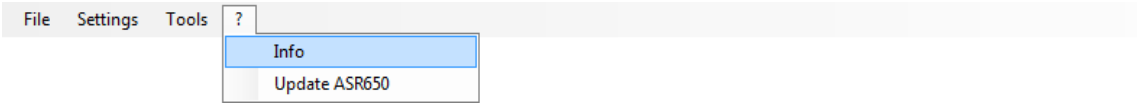
The folder that was created at the chosen destination should contain the files shown on the left.

These files provide information about the complete reader status at the point of sampling the data.

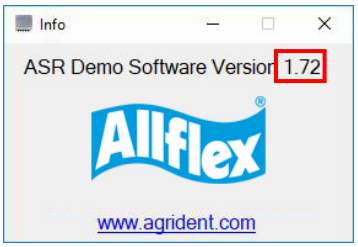
In case of technical problems, especially problems with the reading performance, please provide as detailed information as possible to the support staff. It can also be helpful to take samples in different situations, for example when the reading performance is poor and when it is better. Ideally, different situations are described precisely then. This will make trouble shooting faster and easier.

4.3.4 Help

The '*?*' menu contains the menu items '*Info*' and '*Update ASR650*'.

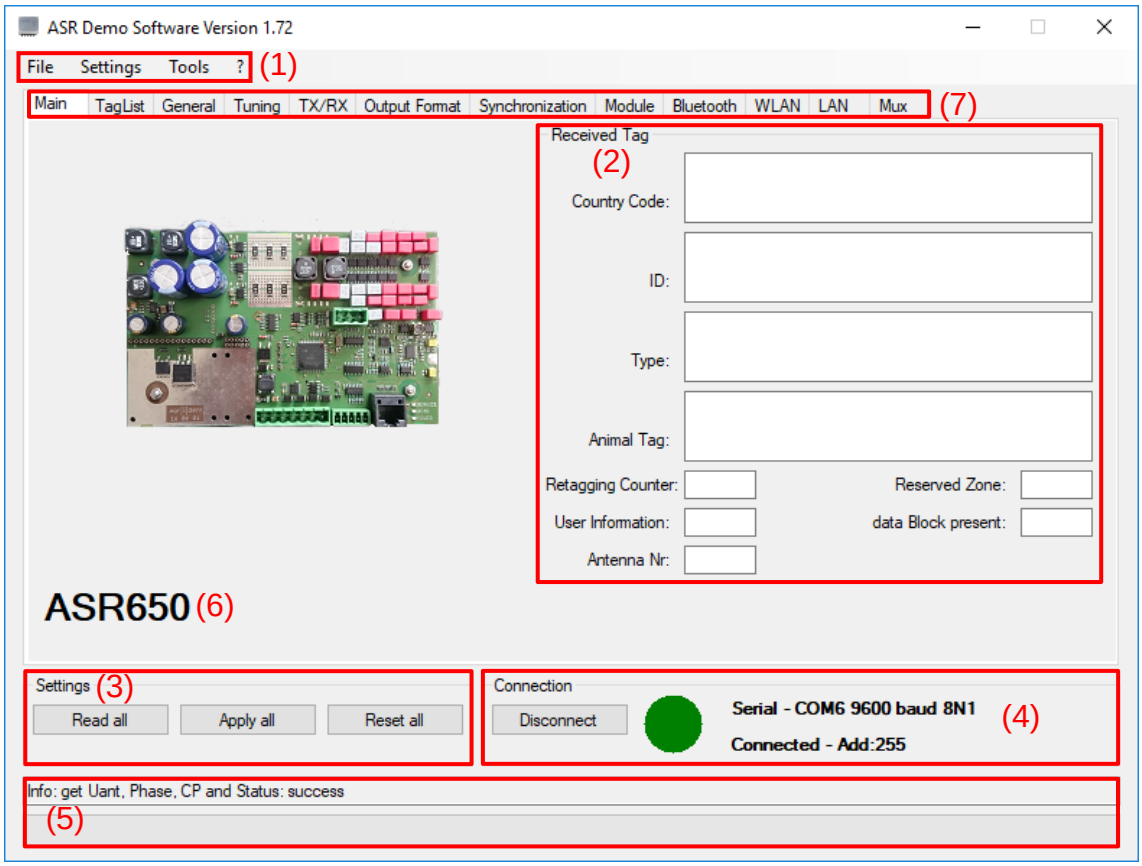


The '*Info*' menu opens a window which shows the version of the software.



'*Update ASR650*' starts the Firmware update tool. Usually it is not required to start this manually because *ASR-PC-Demo* automatically detects when there is a newer Firmware available as the one which is currently used in the device. But anyway, the update can also be started from here.

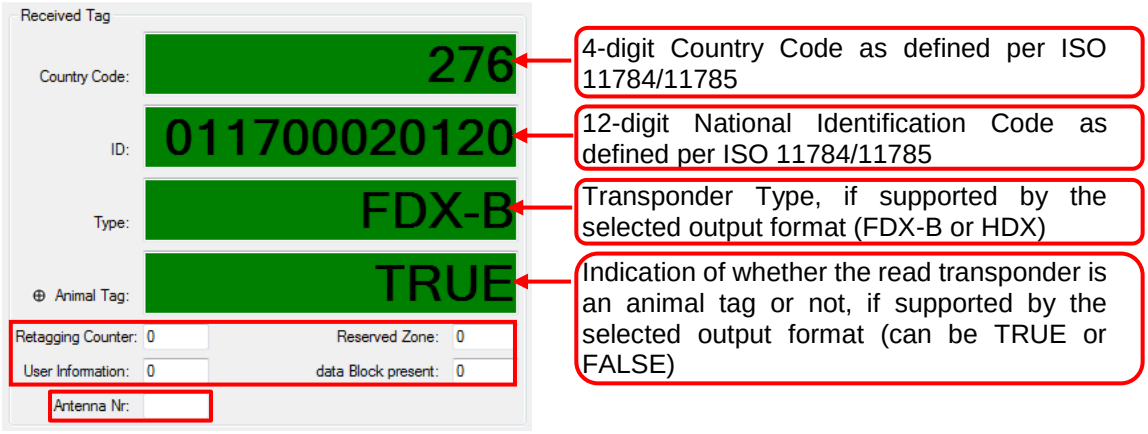
4.4 The Main-Window of the PC-Demo Software



After *ASR-PC-Demo* was started and the connection to the ASR650 was established successfully, you should see a screen similar to the one above. The main screen consists of the File menu (1), the sections '*Received Tag*' (2), '*Settings*' (3), '*Connection*' (4) and an area for status messages ('*Info*') (5) which also contains a progress bar. Beside that you can see which type of reader is connected to the software – here an ASR650 (6). The different reader settings are organized in several tabs (7), depending on their category.

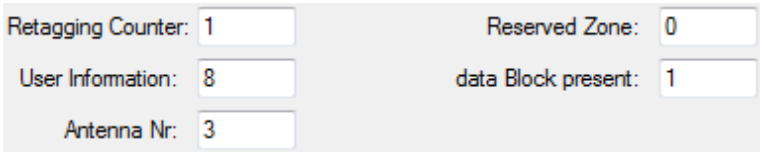
4.4.1 Received Tag

This section is used for displaying the IDs which have been sent by the reader. Each time a tag number is received, the background color of the text fields turns into green for a short time.



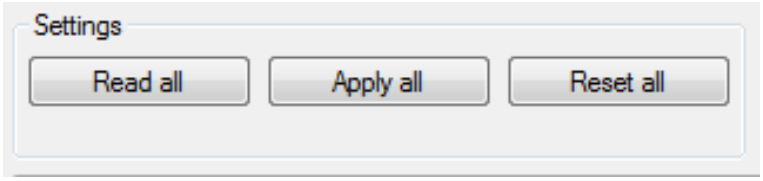
In this case the output format was '*Byte Structure*'. This format does not only provide the information if the tag is an animal tag or not, but also the other '*Advanced ISO information*' like '*User Information*' (also called 'Species Code'), '*Reserved Zone*', '*Retagging Counter*' or the '*Data Block Flag*'. The antenna number is only shown when using an antenna multiplexer and only if the selected output format contains this information.

The screenshot below shows this section with different results. The '*Advanced ISO information*' have different values and this time a multiplexer was used and the tag was read on antenna '3'.



4.4.2 Settings

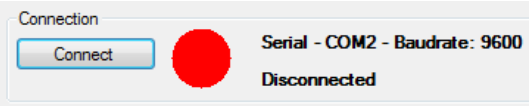
These buttons are available within all tabs of the main window. '*Read all*' requests all reader settings in one step, independently of the tab which is currently active. '*Apply all*' is similar but will send all settings to the ASR650. '*Reset all*' will set the reader back to factory default values.



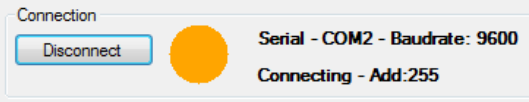
Please note that there is no additional 'Save' command necessary for storing the configuration in the reader's non-volatile memory like it had to be done for the previous Allflex Stationary Readers. The only exceptions are the setting for RF on / RF off and particular multiplexer settings.

4.4.3 Connection

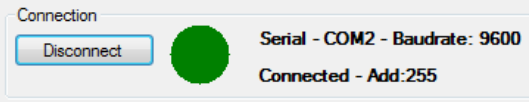
As already mentioned earlier in this manual, the '*Connection*' area indicates the serial connection status of the reader. There are three possible conditions:



The port is closed. You have to click '*Connect*' in order to open the port. Please make sure that port name and baud rate are correct, otherwise please change these settings via '*Connections*' in the file menu '*Settings*'.



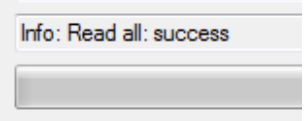
The PC-Demo Software opened the port and tries to connect to the reader. If this does not succeed after some seconds, please check your port settings again.



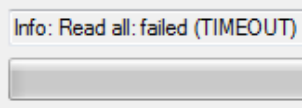
The program could connect to a reader successfully. The complete reader settings (from all tabs) are requested and the values in *ASR-PC-Demo* are updated accordingly.

4.4.4 The 'Info' area

This section is used for displaying status messages. In addition, there is a progress bar indicating the status of the operation to be executed.



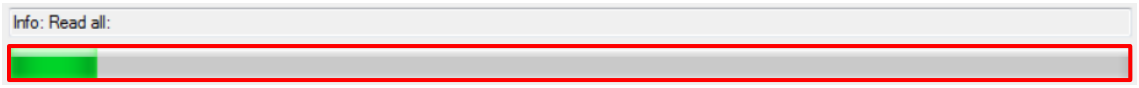
In this example the request for all reader settings ('*Read all*') was answered by the reader successfully.



As we can see here, the command could not be sent to the reader successfully, i.e. there was no response received from the reader.

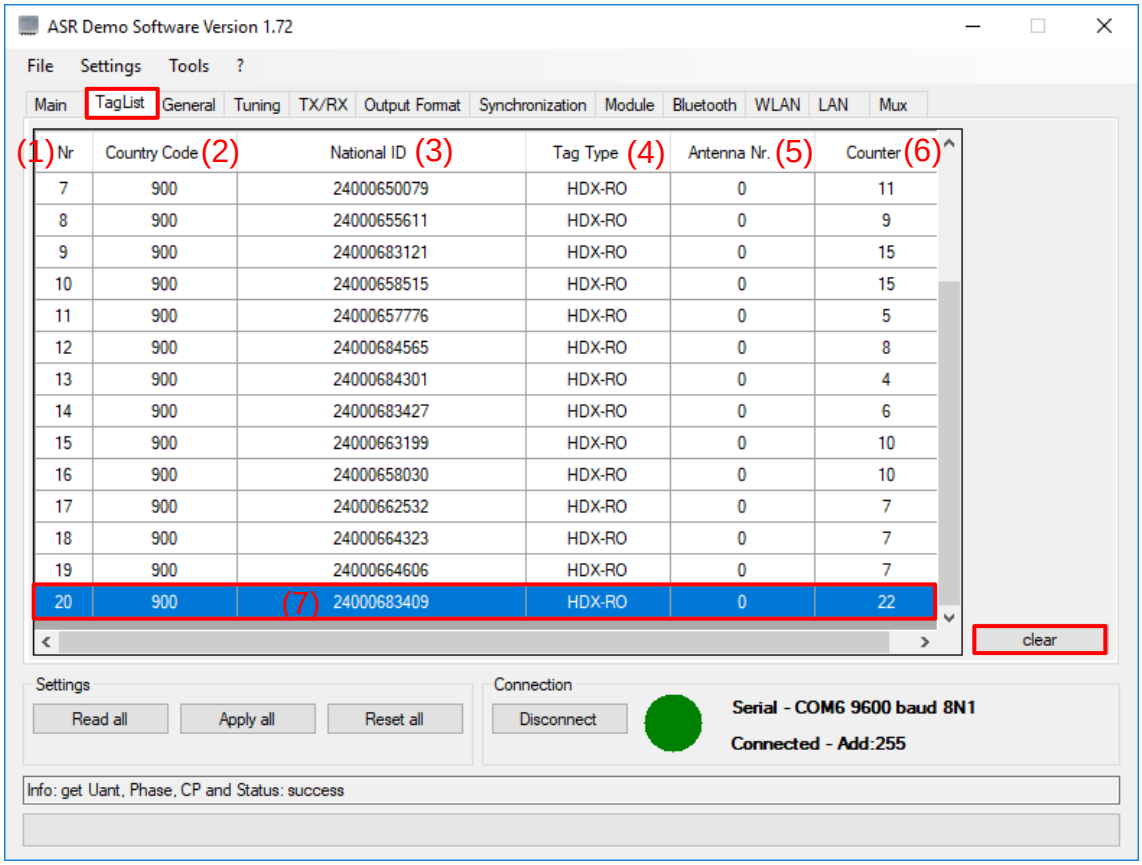
This works similar for all '*Set*' or '*Get*' operations.

The picture below shows the progress bar directly after requesting the reader configuration.



4.5 Taglist

The tab '*Taglist*' provides a list of all transponder which have been read since starting the connection. There are six columns: '*Nr.*' (1), '*Country Code*' (2), '*National ID*' (3), '*Tag Type*' (4), '*Antenna Nr.*' (5) and '*Counter*' (6).

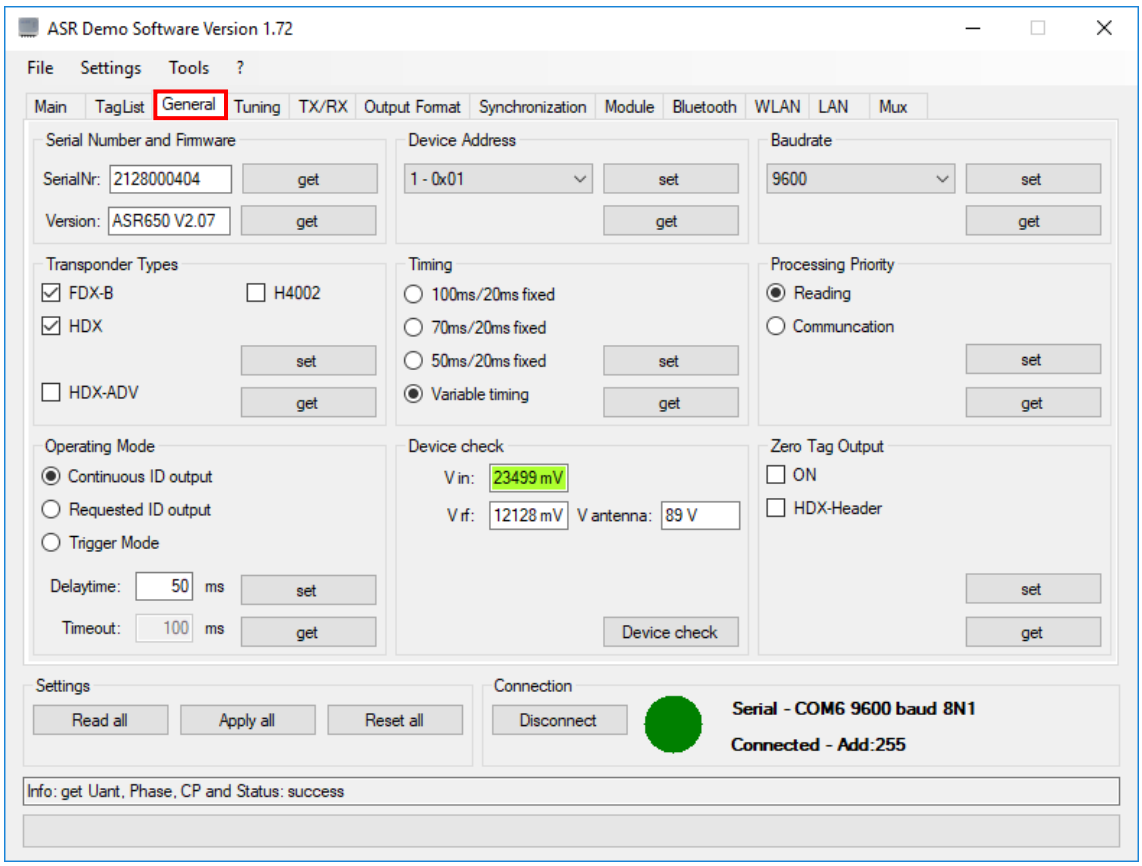


When a new transponder is read, it will be added to the list (in this case this would be Nr. 21). In case a known tag is read again, the blue marker (7) will 'switch to the according line in the list. The '*Counter*' (6) is incremented each time this ID appears again.

'*Tag Type*' (4) and '*Antenna Nr.*' (5) can only be displayed if the reader uses an output format that transmits this information.

The list can be emptied by clicking the '*clear*' button.

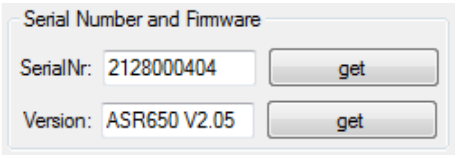
4.6 General Settings



The '*General*' tab provides access to several different reader settings, which are responsible for the common operating characteristics.

4.6.1 Serial Number and Firmware Version

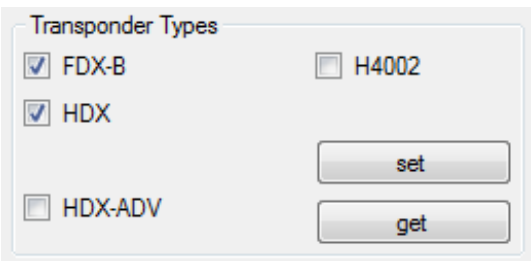
You can request the 10-digit serial number of the reader, which corresponds with the label on the printed circuit board. The Firmware version of the reader is shown below.



The '*get*' buttons only request these particular settings while '*Read all*' will request all reader settings. The '*set*' buttons function accordingly.

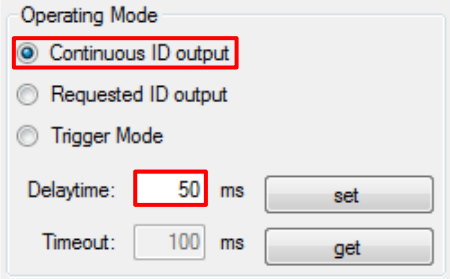
4.6.2 Transponder Types

Since the ASR650 is a reader according to the ISO11784/11785 regulations, it can read FDX-B and HDX transponders. Anyway, if you do not want to read either of both technologies, you might deactivate it here. H4002 and HDX-ADV are different technologies, but they are supported optionally as well.



4.6.3 Operating Modes

The ASR650 has three different operating modes. They allow to adapt the behaviour of the reader to several applications and have to do with field activation and different ways of the ID transmission to the interface in general.



1. Continuous ID output

The reader has its RF-field activated all the time. As soon as a transponder was read, the ASR650 will send the EID to the interface. The interface can be RS232, RS485 or Bluetooth or WLAN or Ethernet in case of using the corresponding add-on module. The repeated transmission of one and the same ID can be controlled via the setting '*Delaytime*'. The parameter '*Timeout*' is greyed out here because it is only important for the '*Trigger Mode*'.

Please note that the '*Continuous ID output*' mode must not be used in case of having more than one reader connected via RS485 since RS485 does not support anti-collision. For such applications you either have to use '*Requested ID output*' or '*Trigger Mode*'. The '*Continuous ID output*' mode is intended to be used for point-to-point connections only. This does not apply if you are using the Ethernet or WLAN option since these interfaces do support anti-collision.

The '*Continuous ID output*' mode was called '*Master Mode*' for the previous reader generations.

The '*Delaytime*' is the period the reader waits before sending one and the same ID repeatedly. If the ASR decodes a different ID, the '*Delaytime*' does not matter. The '*Delaytime*' is configurable in milliseconds.

Value Hex	Value Decimal	Description
00	0	Maximum Delaytime; one and the same ID will not be transmitted again until another transponder was read.
01	50ms	Default value; the same ID will be transmitted again after 50ms, if the transponder was read again.
02	100ms	The same ID will be transmitted again after 100ms, if the transponder was read again.
…	…	Values in 50ms steps are possible
FE	12700ms	Largest possible numeric value
FF	12750ms	No Delaytime. The ID will be transmitted repeated directly after reading.

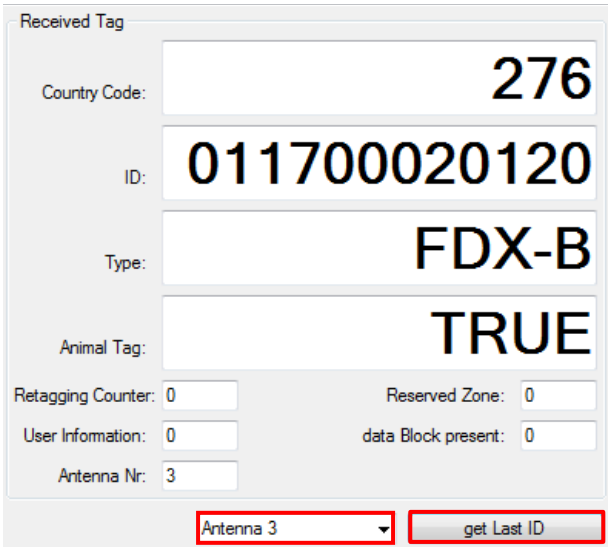
2. Requested ID output

In this operating mode the RF-field is activated permanently as well, but the reader will not transmit any ID until there is a request from an external controller (‘*Last_ID request*’). If the ASR650 detects a transponder, the ID will be written into an internal buffer. The buffer can contain 10 IDs maximum. The ID which is written into the buffer first is also the ID which is read from the buffer if a *Last_ID request* was received (FIFO). Sending several *Last_ID requests* is a way of emptying the buffer.

If you have lots of ASR650s connected to one RS485 bus, you have to poll the readers – one after the other. Therefore, you have to give the readers different network addresses first, using a point-to-point connection. Please see chapter 4.6.4 (Device Addresses) for details.

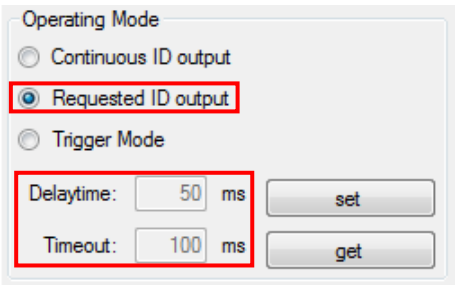
The ‘*Last_ID*’ requests to the different readers have to contain the corresponding reader address as destination address. If you have to implement this into your own software, the ASR650 protocol description provides further helpful information.

If the reader is set to this operating mode, you will see an additional button ‘*get LAST ID*’ in the ‘*Received Transponder*’ section of the ‘*Main*’ tab.



It is also possible to include the antenna number into the ‘*Last ID requests*’ in case an antenna multiplexer is used. There is a buffer for 10 IDs for each antenna channel then.

If the reader is running in Requested ID output mode, the input fields ‘*Delaytime*’ and ‘*Timeout*’ are greyed out, since they are meaningless in this operating mode.



The ‘*Requested ID output*’ mode was called ‘*Slave Continuous*’ for old ASR models.

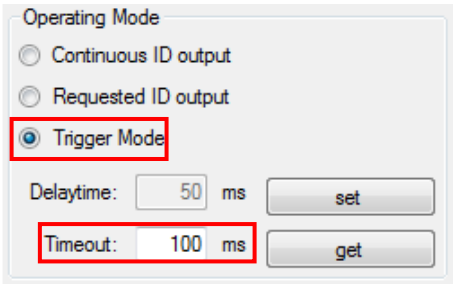
3. Trigger Mode

Using the '*Trigger Mode*' will force the ASR650 not to activate the RF-field until the reader receives a '*Single_ID request*'. In this case the ASR will activate the field until the configured '*Timeout*' has elapsed OR a transponder was read. If the *Timeout* has elapsed and no transponder was read, the reader will return an '*Empty ID*' message.

The *Timeout* determines the maximum time in which the ASR650 tries to read a transponder before deactivating the field again. The value is configurable in milliseconds.

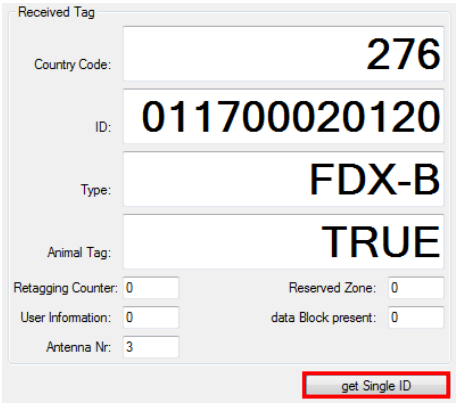
Value Hex	Value Decimal	Remarks
01	100ms	Default
02	200ms	
…	…	100 ms steps
FF	12750ms	Maximum value

If a transponder was read before the *Timeout* has elapsed, the ASR650 will immediately switch off its RF-field and return the tag number.



The *Delaytime* is greyed out because it does not have a meaning in case of using the *Trigger Mode*.

If the reader is configured to work in the *Trigger Mode*, there is an additional pushbutton in the *Received Transponder* area of the *Main* tab, '*get Single ID*'.

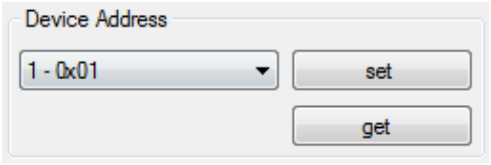


Pushing this button, the software will send a '*Single_ID request*' to the reader. The ASR650 will activate its RF-field until it read a transponder or the configured *Timeout* has elapsed. In case of having read a tag, the reader will return the ID. If the *Timeout* is over before a transponder could be read, the ASR will return an '*Empty ID*' message.

The '*Trigger Mode*' was called '*Slave Request*' mode for previous reader generations.

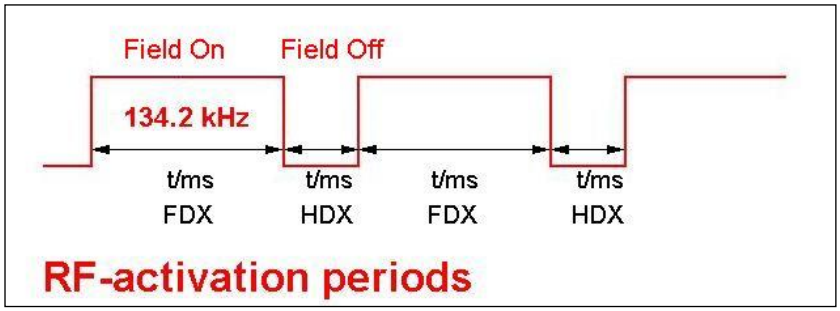
4.6.4 Device Address

In case of using several readers on an RS485 bus, each reader has to have an individual network address. The addresses have to be assigned using a point-to-point connection first. For details about the allowed addresses, please refer to the ASR650 protocol description.



4.6.5 Timing

In order to allow the ASR650 to read both transponder technologies – FDX-B and HDX – the reader has to switch on and off the field for certain periods. This is called '*Timing*'. Per default, the ASR uses the '*Variable timing*' as defined per ISO11784/11785. In this timing, the reader decides about length of the field on / field off periods on its own. The results of those decisions depend on the presence of a corresponding transponder.



The following patterns are possible using the variable timing:

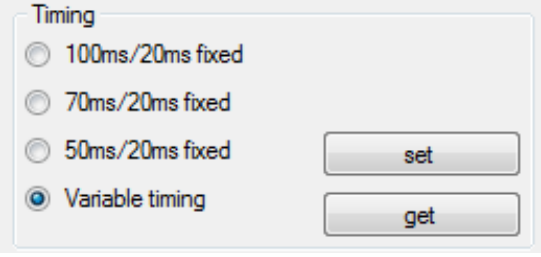
FDX tag present?	HDX tag present?	Field-On time	Field-Off time
No	No	50ms	4ms
Yes	No	50…100ms	4ms
No	Yes	50ms	20ms
Yes	Yes	50…100ms	20ms

A field-on period followed by a field-off period can be called 'slot' or 'cycle'. In the '*Variable timing*', every 10th cycle is 50:20 milliseconds fixed. This should allow wireless synchronizing handheld readers to read an HDX tag at least once a second.

However, there might be applications where a fixed timing could be the better choice. Therefore, the ASR650 offers three different timings with a fixed length for the slots: 50:20, 70:20 or 100:20. Independently of the setting, every 10th cycle will be 50:20 again. If the stationary reader would not do that, no handheld close to it would be able to read an HDX tag at all in case of using 70:20 or 100:20.

Select the timing you want to use for your application and press the '*set*' button. After a reset to factory defaults, the ASR650 will always use the '*variable timing*' again.

The '*get*' button requests the currently configured setting from the reader.



4.6.6 Device Check

The '*Device check*' requests 3 voltages from the reader, which are important for the operation.

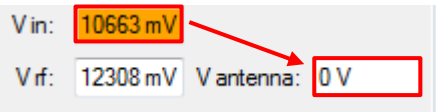
1. *V in*: Shows the DC supply voltage for the reader. The ASR will disable the antenna, if the voltage is 11.0 volts or lower (measured on the reader board, not at the power supply).

2. *V rf*: The transmitter voltage depends on the selected power level (see chapter 4.8 for details). In case of using the maximum transmit power level, the transmitter voltage is about 12V.

3. *V antenna*: The antenna voltage depends on the transmitter voltage and the antenna impedance (which can also be affected by the presence of metal). The antenna voltage can be up to 100V when operating in the highest power level. When the transmitter voltage is lower, the antenna voltage will be lower accordingly. If the antenna impedance is lower, the antenna voltage will be smaller as well.

Press '*Device check*' in order to get the latest measured voltages from the reader. In case of a fault condition, the corresponding text field will turn orange.

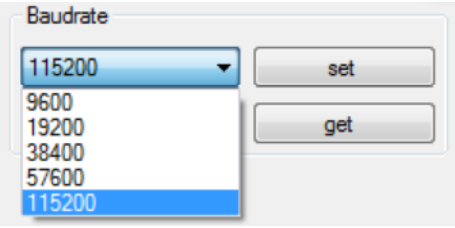
This is an example for a low input voltage. As a result, the antenna voltage is '0V' because the reader deactivated the antenna.



4.6.7 Baud Rate

The ASR650 provides RS232 and RS485 as standard interfaces. The baud rate described here refers to those two interfaces, not to the baud rate of optional communication modules like Bluetooth, WLAN or Ethernet.

Choose the intended baud rate and confirm with '*set*'. The currently used setting can be requested via '*get*'.

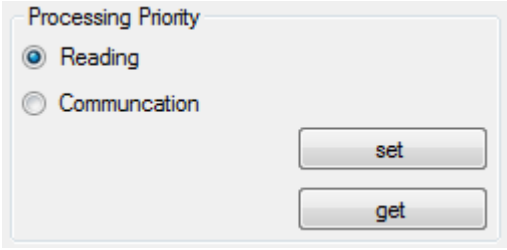


It is absolutely important that the baud rate of any PC-Software or customized controller is the same as the configured baud rate for the ASR650. If this is not the case, communication will not work at all.

4.6.8 Processing Priority

The '*Processing Priority*' decides whether tag reading or communication should be handled with a higher priority. The default value is '*Reading*'. In case a command is sent to the reader, the reading slot will be finished first. The request is being processed at the end of the next HDX period. When '*Communication*' is selected, reading is aborted immediately and the request will be processed right away.

Select the desired processing priority and press '*set*'. The currently configured setting can be requested via the '*get*' button or via '*Read all*'.

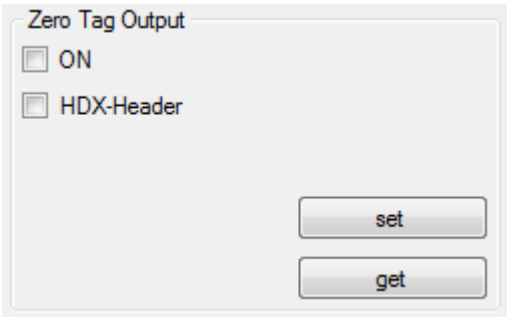


Having the priority set to '*Communication*' and sending requests to the reader too often and too fast leads to a reduced reading speed because each request can result in the abortion of the current reading cycle.

4.6.9 Zero Tag Output

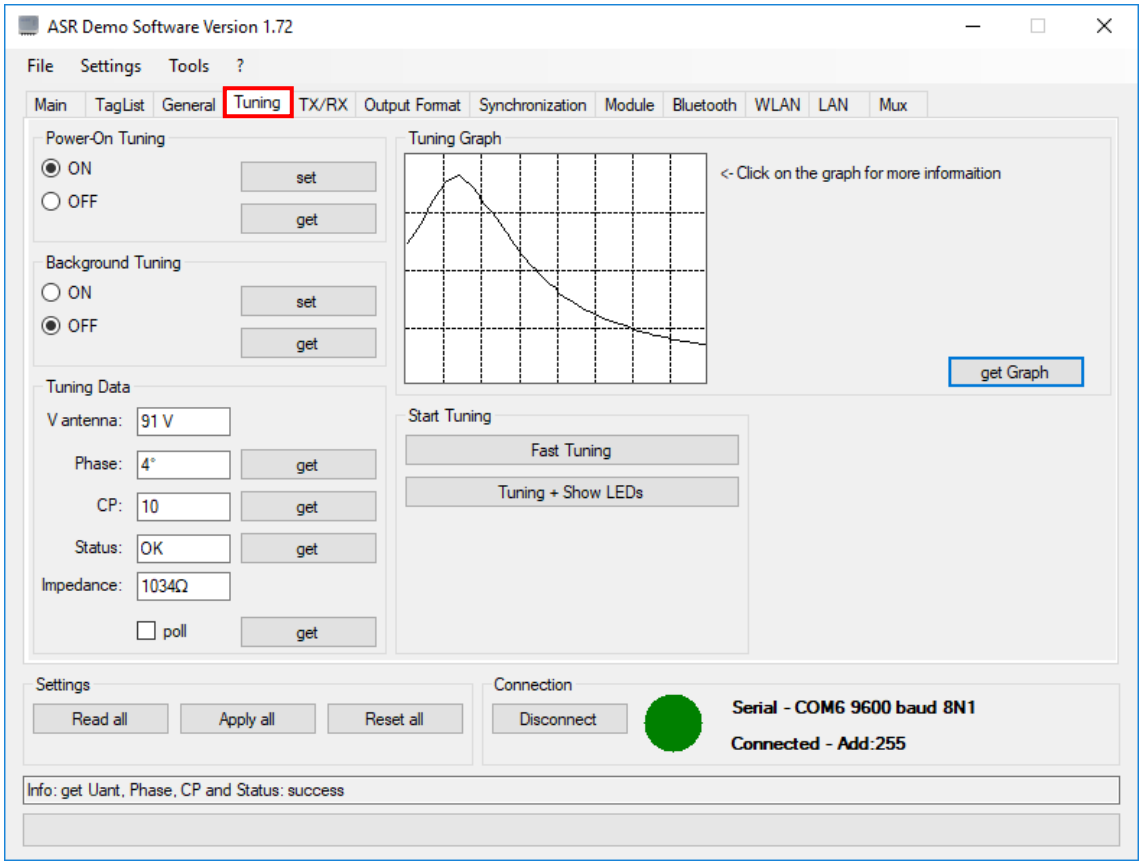
This section contains the settings that deal with tag outputs from the reader when no tag has been read successfully. By setting the checkbox '*ON*' the reader is configured to always sending 'empty tags' repeatedly about every 50 milliseconds. This allows the host to ensure that the communication is still running okay. When '*HDX-Header*' is set, the reader will send an 'empty ID' in case it detected a header at the beginning of the HDX telegram but it could not decode a valid number. This can happen in case of data collision when two or more HDX tags are present at the same time.

Enable the desired setting and press '*set*' in order to send configuration to the reader. Via the '*get*' button or via '*Read all*' the currently configured settings can be requested.



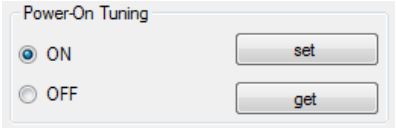
4.7 Tuning

The tuning tab provides useful information about the current antenna status. You might also configure tuning options and start an Autotuning here.



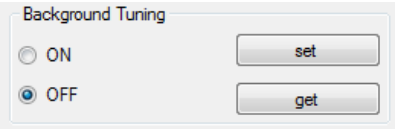
4.7.1 Power-On Tuning

The setting '*Power-On Tuning*' decides if the ASR650 will perform a complete Autotuning procedure after switching on or not. This tuning takes less than 200ms and is enabled per factory default.



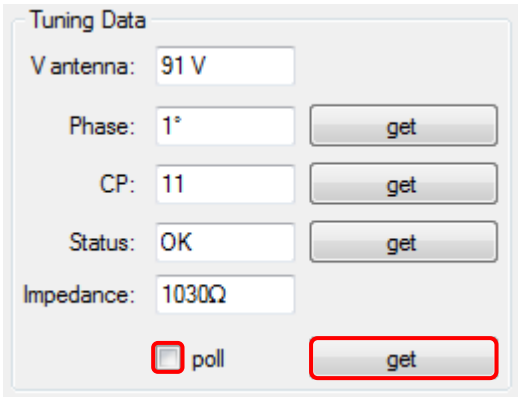
4.7.2 Background Tuning

The ASR650 is capable of changing its tuning value automatically if the environment regarding the presence of metal changes. This may take a few seconds but does not require any manual action. This option is disabled in factory default settings.



4.7.3 Tuning Data

As already mentioned in this manual earlier, the correct tuning of the antenna significantly decides about the reading performance. The section '*Tuning Data*' gives an overview about important values concerning the antenna status.

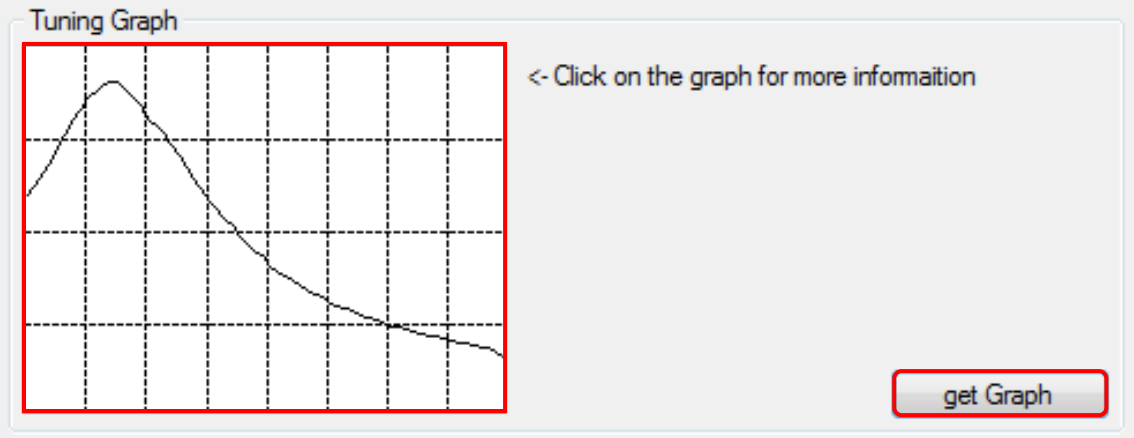


The antenna voltage '*V antenna*' depends on the selected transmit power level and the antenna impedance. At maximum power the voltage can be up to 100V. The Phase is only used for internal purposes, so please don't care about this value. '*CP*' indicates the currently used '***C**apacitor **P**attern*' or tuning value. It should have a value of 9 to 11 ideally. In case of having metal close to the antenna, the value will increase since the reader has to compensate the decreased antenna inductance by setting more tuning capacitors. The '*Status*' field gives further information in case of an antenna fault. In this example it says '*OK*' because there is no antenna fault.
The antenna impedance is a very important value. If this is too low for the selected power level, the reader will disable the antenna. Please also refer to chapter 2.1.6.

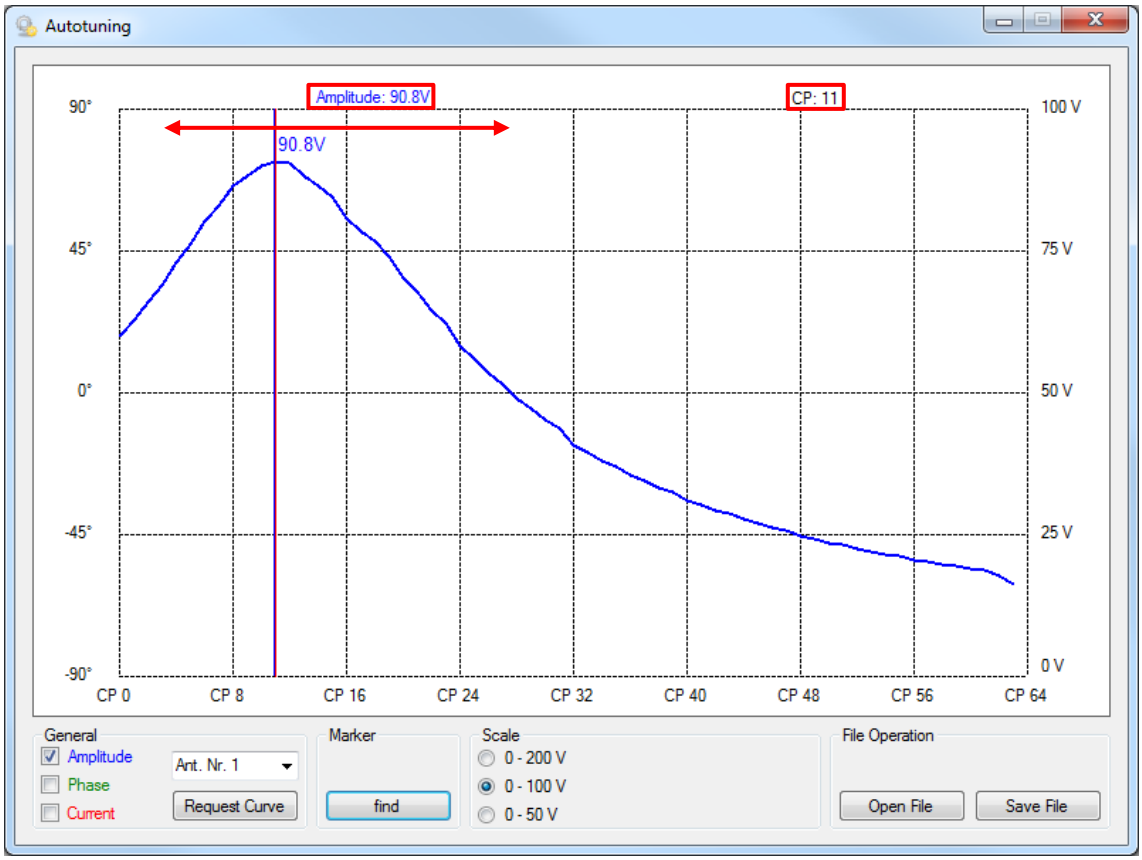
You might request these values once by pressing the '*get*' button, or repeatedly by activating the '*poll*' checkbox. When polling the status, the values will be updated about every second.

4.7.4 Tuning Graph

The '*Tuning Graph*' section allows to request a complete tuning curve from the reader in one step by clicking on the button '*get Graph*'. What the ASR is doing in this case is trying all 64 possible Autotuning combinations while measuring the antenna voltage. The result is a curve indicating where the voltage maximum is located.



If you click on any position within the graph drawing area, an additional window will open.



If you move the mouse within the graph area you will automatically move a marker. Depending on the '***C**apacitor **P**attern*', the voltage value will change accordingly.

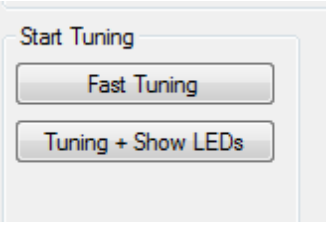
It is also possible to activate curves for '*Phase*' and '*Current*' but it does not make much sense, they are only used for internal purposes – the '*Amplitude*' is the important value for customers. You can select the antenna for requesting the curve for a particular channel here as well, in case an antenna multiplexer is used.

Pressing the '*Request Curve*' button will force the software to request the tuning curve again. The '*find*' button in the '*Marker*' box will set a permanent marker on the Capacitor Pattern which is currently used by the reader.

You might change the scaling of the amplitude as well. For the ASR650 the default setting of '*0-100V*' makes the most sense, if the antenna status is ok and the values are within the correct range.

The section '*File Operation*' allows manually saving the curve and also loading previously saved curves. Loading tuning curves mainly makes sense for watching already recorded data, e.g. in case a customer has sent '*Autodiagnosis*' data for evaluation.

4.7.5 Start Tuning



The Demo Software offers two different ways of Autotuning the reader manually by sending the corresponding command, '*Fast Tuning*' or '*Tuning + Show LEDs*'.

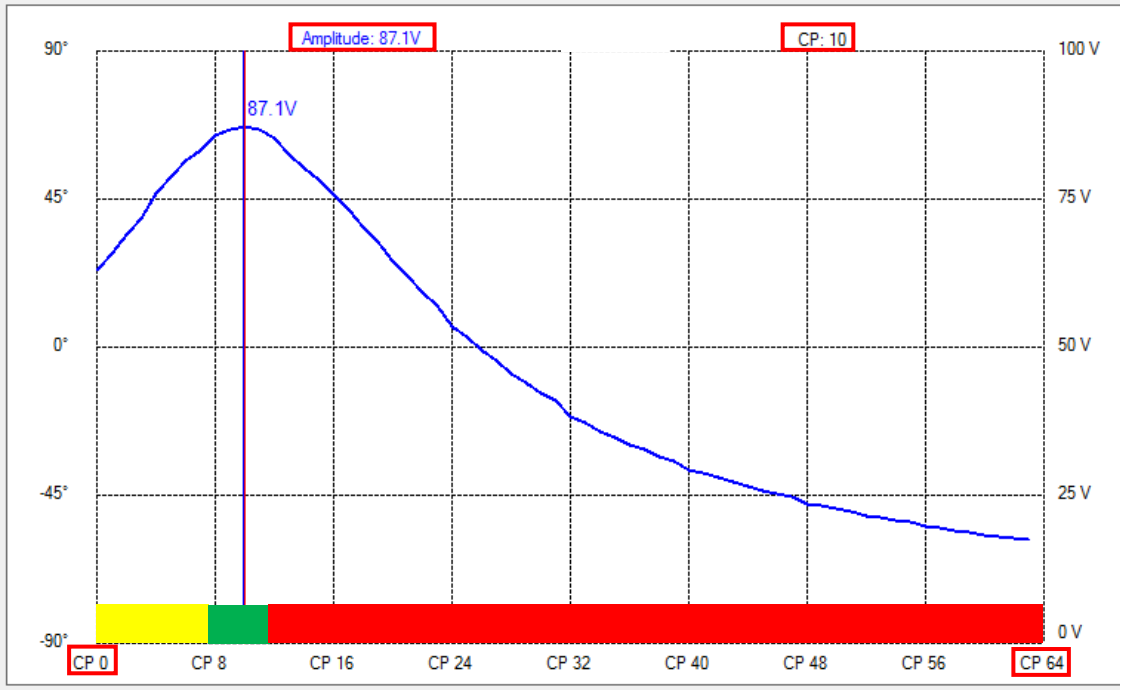
The '*Fast Tuning*' is the same as the automatic tuning after switching on. The reader tries all 64 possible Capacitor Patterns and searches for the maximum voltage. This procedure takes less than 200ms.

'*Tuning + Show LEDs*' will first do the same like '*Fast Tuning*' but after the tuning procedure is finished, the ASR will show an LED sequence fairly slow in order to indicate the approximate position of the voltage maximum.

The LEDs have the following meaning during the indication sequence: yellow means, the voltage is rising. Green indicates that a maximum voltage has been found and red that the voltage is falling.

If the tuning of the antenna is ideal – the reader uses a Capacitor Pattern of 9 to 11 – the yellow LED will be activated very shortly, followed by the green LED and a longer period of the red one. This is because 9, 10 or 11 are pretty much on the left side of 64 possible combinations.

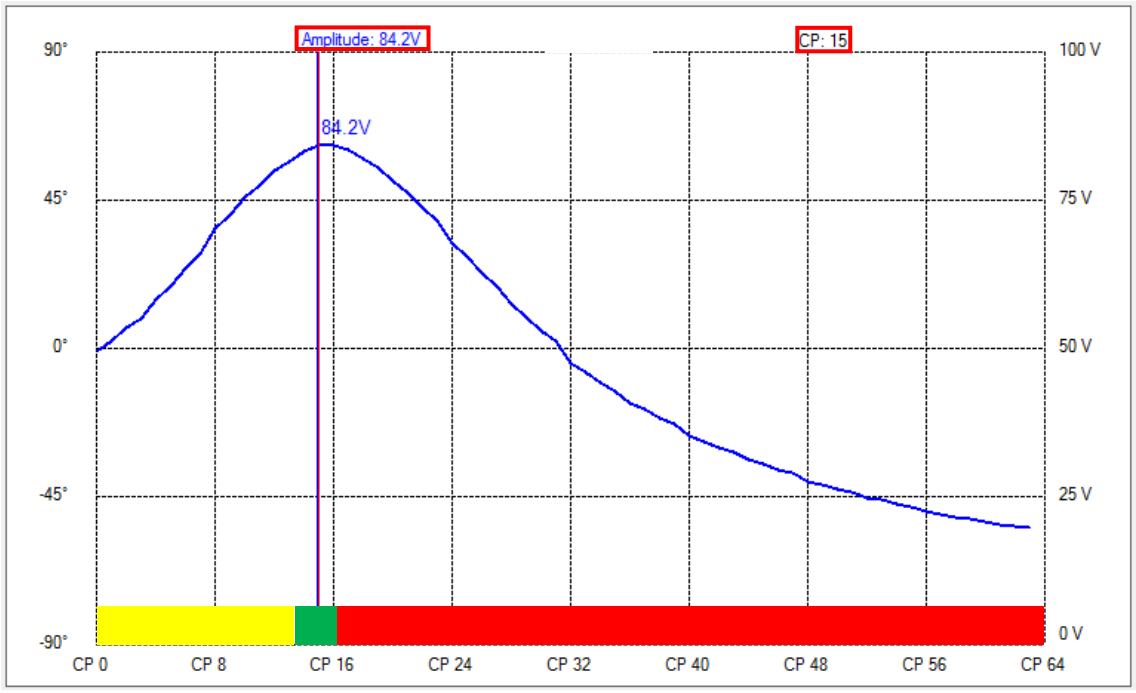
Let's have a look at some example curves:



The above shown curve has shown a maximum voltage at Capacitor pattern 10. The colored bars should simulate the approximate activation times of the LEDs for this example curve. The lowest possible value is CP = 0 on the left side which means that no Autotuning capacitor is set. The highest possible value is CP = 64 on the right side – in this case the ASR has set all tuning capacitors.

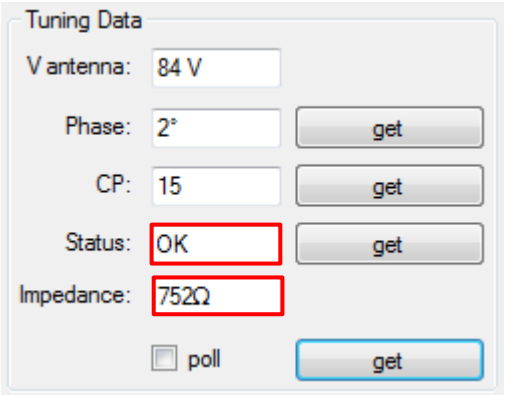
Since a value of 10 is much more on the left side, the yellow LED is switched on for a very short time only. The period for the green LED is also very short because this indicates the voltage maximum. The red LED is activated much longer since this represents the tuning range from CP = 11 to CP = 64.

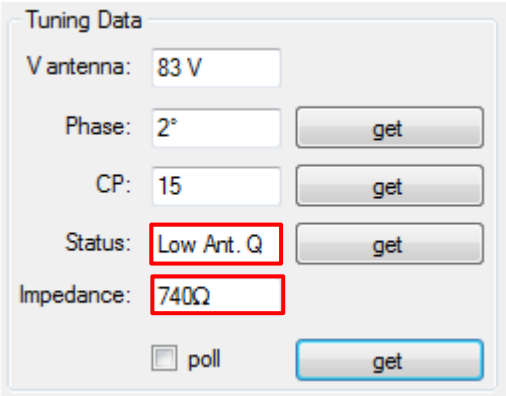
In the next example curve we put the antenna closer to metal. Metal decreases the antenna inductance and thus the reader has to set more Autotuning capacitors for compensating the reduced inductance.



Due to the presence of metal the reader has decided for a Capacitor Pattern of 15. In this case, the yellow LED will be activated slightly longer. What one can also see is that the amplitude has decreased from 87.1V to 84.2V which leads to the following, very important, conclusion:

Although the Autotuning can compensate a lower antenna inductance, it can never compensate the losses caused by too much metal. Even if the reader is still able to tune for the correct resonant frequency, there will be a reduced reading performance. So, you should always try to modify your application in a way that there are no losses like this.

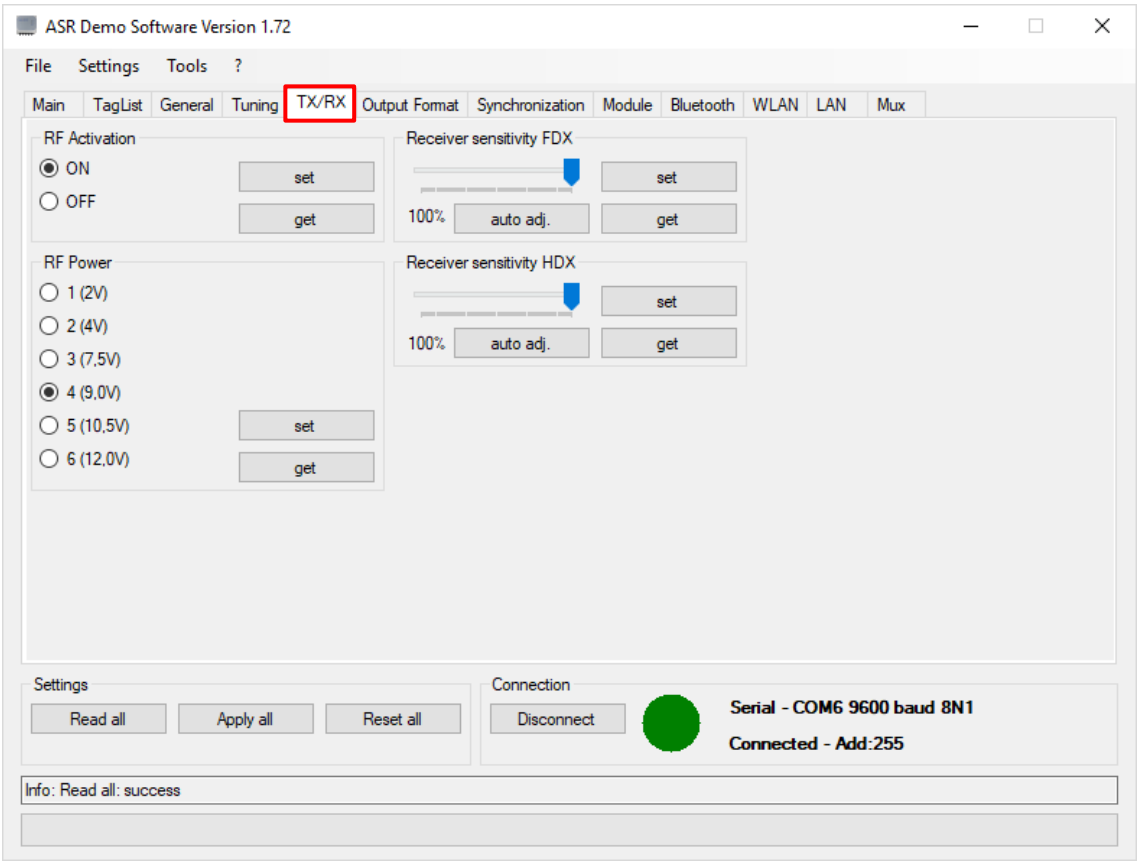




In case the ASR650 is used at maximum transmit power, the minimum required antenna impedance is 750Ω. In the screenshot on the left side, it is only slightly above this limit. In the example on the right side, it is just below the limit and the error code '*Low Ant. Q*' will be shown. This is due to the low antenna impedance. You either have to separate the antenna further from metal or set a lower transmitter voltage. Both measurements were done in the same situation and it becomes obvious that values can vary, so make sure your antenna impedance is always well above the required minimum.

4.8 TX/RX

This section deals with settings for the transmitter and the receivers. These are explained in the next subchapters.

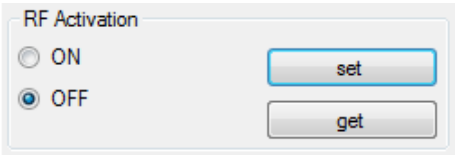


4.8.1 RF-Activation

For certain applications it might be necessary to switch the RF-field on and off manually. Setting the reader into the '*Trigger Mode*' and then back into one of the other operating modes would also switch off and on the field, but this should not be used too often since the new operating mode will always be written into the readers' non-volatile memory, which has a limited amount of write-cycles (Flash-Memory).

So, if your application requires enabling and disabling the RF-field many times a day, you should use this command. It will not be written into the non-volatile memory, just into the RAM; hence this setting is only active as long as the reader is not re-started.

Please select the intended radio button and confirm with '*set*' in order to switch on or off the RF-field. After restarting the ASR650, the RF-field will always be activated, unless the reader is configured to '*Trigger Mode*'.

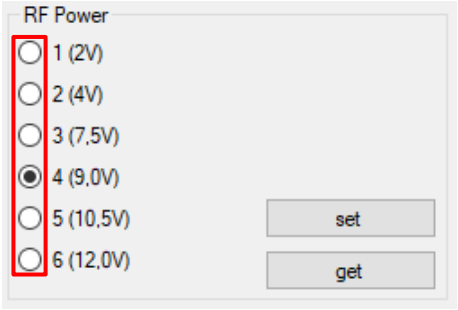


4.8.2 RF Power

The ASR650 offers the possibility to select the transmitter power in six stages. The factory default value is '*4 (9.0V)*'. The highest possible output power is '*6 (12.0V)*'. The higher the output power, the stronger the RF field and hence the reading range (if electromagnetic noise is not a problem). Please keep in mind that there are minimum antenna impedance requirements depending on the selected RF Power (see chapter 2.1.6).

Select the desired RF Power stage and confirm with '*set*' or request the current reader setting via '*get*'.

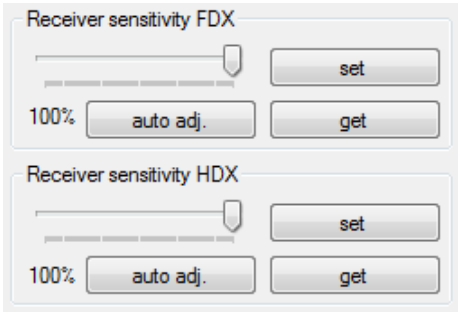
The receiver sensitivity setting might be used in addition in order to fine-tune the reading range.



4.8.3 Receiver sensitivity

In addition to the RF Power setting the reading range can also be influenced by configuring the '*Receiver sensitivity*'. This is possible for both receivers separately – FDX and HDX. The default value of '100%' means that the receivers are operating at full sensitivity.

Select the desired sensitivity and confirm with '*set*' or request the currently configured value via '*get*'. This has to be done for FDX and HDX in case both technologies should be used.



The button '*auto adj.*' helps to find the correct setting when the required reading range is known. Place the tag in front of the antenna at the desired distance in optimum orientation (see chapter 2.1.5 for details). Then press this button in order to set the minimum signal strength for this desired distance. The reader will use the new setting right away.

Please keep in mind that the reading range strongly depends on the transponder orientation. This should be carefully considered when reducing the receiver sensitivity. Tags in an unfavorable orientation might not be read any longer when this sensitivity is too low.

When the application requires a reduced reading range it is recommended rather to reduce the RF-Power than the sensitivity first. It makes no sense to operate the reader at full power while the receiver sensitivity is low.

4.9 Output Format

4.9.1 Introduction

The ASR650 offers a lot of different output formats. Some formats use a transmission frame according to the ASR protocol. In order to get the desired information, e.g. the transponder number, the telegram has to be evaluated by software on the other side, which is a computer in most applications but it may also be a customized controller.

The advantage of using the transmission frame is a fault-free operation because the frame also includes a CRC but it needs knowledge about the ASR protocol in order to get the information out of the telegram.

The following output formats work **with** the transmission frame:

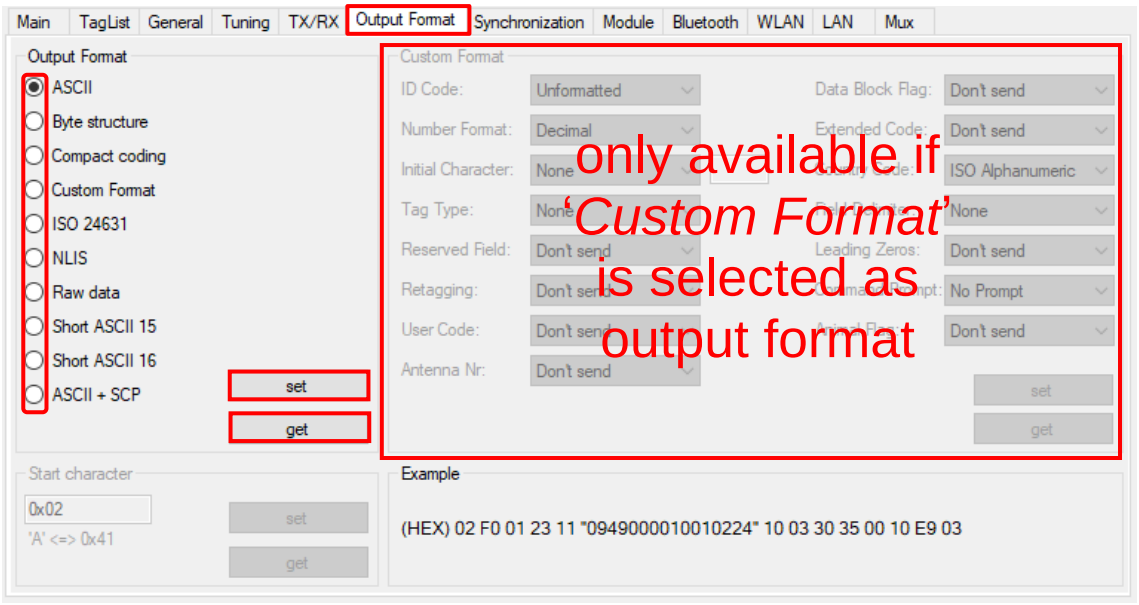
- ASCII
- Byte structure
- Compact coding
- Raw data

There are also formats, which work without the transmission frame. These formats are recommended, if the reader has to work with a scale or in applications, where it is not possible to use the standard protocol.

The following formats work **without** control characters:

- Custom format
- ISO 24631
- NLIS
- Short ASCII 15
- Short ASCII 16
- ASCII + SCP

4.9.2 Changing the output format



In order to change the setting, please select a format first. By pressing the '*set*' button, the configuration is send to the reader and saved automatically. The current setting can be read out via '*get*'.

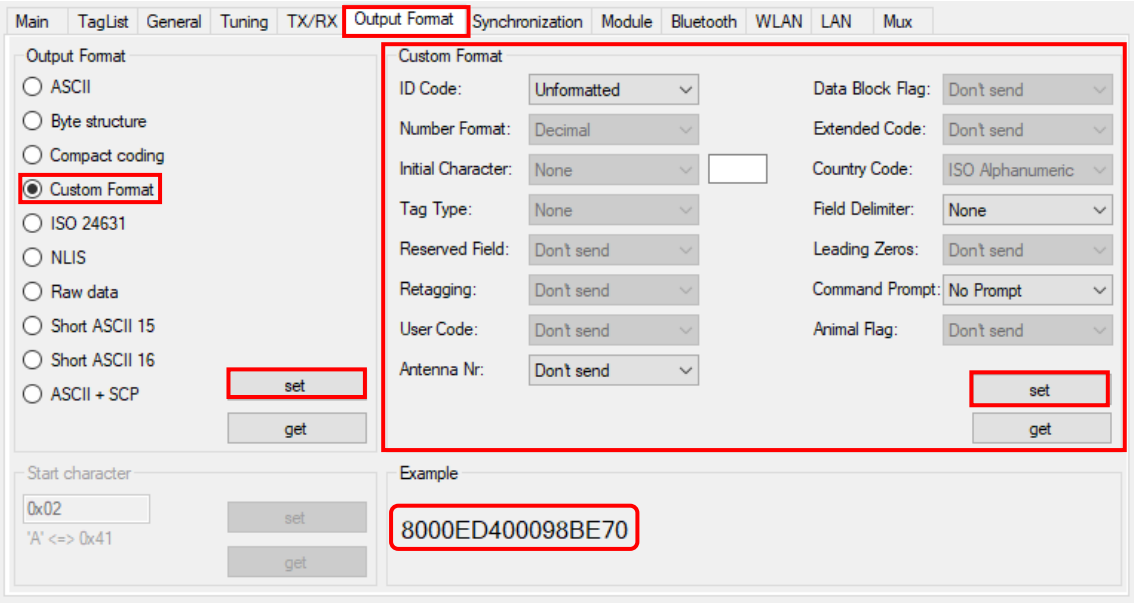
4.9.3 Output Formats description

This chapter deals with the different output formats and explains the ones without transmission frame in detail. Formats using frame according to the ASRs' protocol will not be described in this manual since the evaluation of those formats requires knowledge about software development. For this reason, they are only described in the ASR650 protocol description in detail.

4.9.3.1 Custom Format

The '*Custom Format*' works like a construction kit, the operator can put together the output string according to the requirements of his application. It does not use the transmission frame.

In order to gain access to the '*Custom Format*' panel, you have to choose '*Custom Format*' as the output format first. For any other output format, the '*Custom Format*' selection panel is greyed out.



In the above screen one can see that the default value for '*ID Code*' is '*Unformatted*'. In this case the reader transmits the 64-Bit transponder 'raw data' in hexadecimal notation. Below the Custom Format configuration box, you can see a preview of your selected output format. In '*Unformatted*', you can only select a '*Field Delimiter*', a '*Command Prompt*' and it is possible to send the antenna number, which is interesting in case an antenna multiplexer is used.

If the '*ID Code*' is set to '*Formatted*', it is possible to select or deselect initial characters and additional information or to cut leading zeros. Select your desired custom format and press the corresponding '*set*' button. The '*Example*' preview will always be updated right away.

The different options and their settings are described below.

ID Code	
FORMATTED	allows the selection and formatting of the individual ID code items
UNFORMATTED	sends 16 digits of unformatted hexadecimal transponder data

Number Format	
DECIMAL	decimal (0-9) number presentation
HEXADECIMAL	hexadecimal (0-9 and A-F) number presentation

Initial Character	
The Initial Character is a single ID code string identifier character, sent as the first identification code character.	
# (ALLFLEX STYLE)	sends '#' as first ID code string character
L (TIRIS LINE MODE)	sends '*L'* as first ID code string character
X (TIRIS EXECUTE MODE)	sends '*X'* as the first ID code string character
G (TIRIS GATE MODE)	sends '*G'* as first ID code string character
Self defined	*
None	no initial character is sent
*…	
If you choose '*Self defined*', any ASCII character can be selected. The character can be entered in hex notation (0x..) or as the number of the designated ASCII character. It is also possible to enter the ASCII character directly. An example: *You want the ASCII character "A" as initial character.* Enter '*A*' into the corresponding field → ASCII character **or** Enter '*0x41*' into the corresponding field → Hex number of the ASCII character '*A*'	

Tag Type ID	
Transponder type identification character	
ALLFLEX STYLE	
FDX-B-ISO transponders	F
HDX-ISO transponders	H
HDX-Industrial R/O transponders	R
HDX-Industrial R/W transponders	W
TIRIS STYLE	
FDX-B-ISO transponders	A
HDX-ISO transponders	A
HDX-Industrial R/O transponders	R
HDX-Industrial R/W transponders	W
None	no tag type identification character is sent

Reserved Field	
Don´t send	does not send the reserved field data
Send	does send the reserved field data

Retagging Counter	
Don´t send	does not send the retagging counter
Send	does send the retagging counter

User Code	
Don´t send	does not send the user code
Send	does send the user code

Data Block Flag	
Don´t send	does not send the data block flag
Send	does send the data block flag

Antenna Nr.	
Don´t send	does not send the antenna number
Send	does send the antenna number

Extended Code	
'*Extended Code*' is the country or manufacturer code. It consists of 4 digits. Manufacturer codes have decimal values larger or equal to 900, country codes have decimal values lower than 900.	
Don´t send	does not send the extended code
Send	does send the extended code

Country Code	
ISO ALPHANUMERIC	If the extended code is a country code, it will be sent as an alphanumeric representation, e.g. '*DEU*' for Germany. If the extended code is a manufacturer code its decimal value will be sent in numeric representation.
NUMERIC	The decimal value of the extended code will be sent in numeric representation, e.g. '*276*' for Germany.

Field Delimiter	
The field delimiter separates identification code items. Between the initial character and the ID-tag type identification character, no delimiter is sent!	
Tabulator	a tabulator separates ID code items
Semicolon	a semicolon separates ID code items
Comma	a comma ID code items
Space	a space separates ID code items
None	No separation

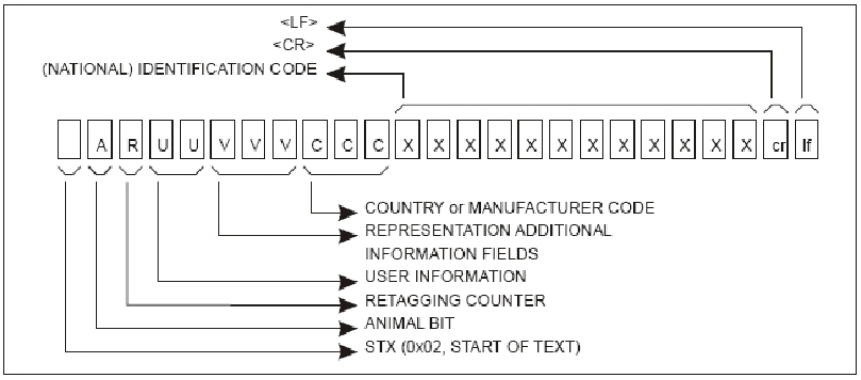
Leading Zeroes		
		Example
Don't Send	does not send leading zeroes	980 123456
Send	does send leading zeroes	980 000000123456

Command Prompt	
Enables/Disables transmission of the command prompt '>' as a trailer of messages. If you work with terminal software like Hyperterminal, it provides a better overview of the communication process.	
No prompt	disables transmission of the command prompt
Send prompt	enables transmission of the command prompt

Animal Flag	
Don´t send	does not send the animal flag
Send	does send the animal flag

4.9.3.2 ISO 24631

The '*ISO 24631*' format contains additional information like '*Animal Flag*', '*Retagging Counter*', '*Species Code*' and so on. The last characters of the telegram will be <*CR*> (0x0D) <*LF*> (0x0A).



Transmission of information by a communication link, excluding the time stamp option, as defined per ISO 24631.

The '*ISO 24631*' format allows defining the start character of the telegram. Enter the desired character in decimal or hexadecimal notation and press the corresponding '*set*' pushbutton. The factory default start character is '*0x02*'.

4.9.3.3 NLIS

If '*NLIS*' is activated, 16 digits will be transmitted in ASCII notation without frame. The leading zero of the country code is not transmitted. The '*NLIS*' format is the same like '*Short ASCII 15*', but with a space as delimiter between country code and ID. The last characters of the telegram will be <*CR*> (0x0D) <*LF*> (0x0A).

ID0	ID1	ID2	ID3	ID4	ID5	ID6	ID7	ID8	ID9
'9'	'8'	'4'	' '	'0'	'1'	'0'	'9'	'0'	'0'
ID10	**ID11**	**ID12**	**ID13**	**ID14**	**ID15**	**CR**	**LF**		
'3'	'1'	'6'	'3'	'5'	'8'	0x0D	0x0A		

ID0...ID15	'984 010900316358'
CR	0x0D
LF	0x0A

4.9.3.4 Short ASCII 15

When '*Short ASCII 15*' is activated, 15 digits (3 digits country code + 12 digits national ID) will be transmitted in ASCII notation without frame. The leading zero in the country code is not transmitted. The last characters of the telegram are <*CR*> (0x0D) <*LF*> (0x0A).

ID0	ID1	ID2	ID3	ID4	ID5	ID6	ID7	ID8	ID9
'9'	'8'	'4'	'0'	'1'	'0'	'9'	'0'	'0'	'3'
ID10	**ID11**	**ID12**	**ID13**	**ID14**	**CR**	**LF**			
'1'	'6'	'3'	'5'	'8'	0x0D	0x0A			

ID0...ID14 '984010900316358'
CR 0x0D
LF 0x0A

4.9.3.5 Short ASCII 16

'*Short ASCII 16*' is the same as '*Short ASCII 15*' but the leading zero in the country code is transmitted. The last characters of the telegram are <*CR*> (0x0D) <*LF*> (0x0A).

ID0	ID1	ID2	ID3	ID4	ID5	ID6	ID7	ID8	ID9
'0'	'9'	'8'	'4'	'0'	'1'	'0'	'9'	'0'	'0'
ID10	**ID11**	**ID12**	**ID13**	**ID14**	**ID15**	**CR**	**LF**		
'3'	'1'	'6'	'3'	'5'	'8'	0x0D	0x0A		

ID0...ID15 '0984010900316358'
CR 0x0D
LF 0x0A

4.9.3.6 ASCII + SCP

When '*ASCII + SCP*' is selected, only the last 10 digits of the national identification code are transmitted.

ID0	ID1	ID2	ID3	ID4	ID5	ID6	ID7	ID8	ID9
'0'	'9'	'0'	'0'	'3'	'1'	'6'	'3'	'5'	'8'
CR	**LF**								
0x0D	0x0A								

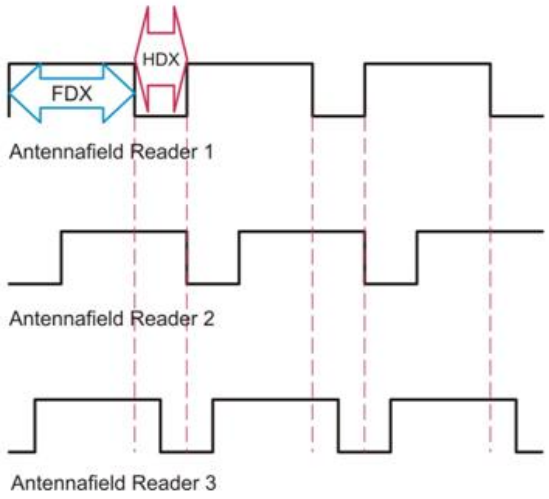
ID0...ID9 '0900316358'
CR 0x0D
LF 0x0A

The last characters of the telegram are <*CR*> (0x0D) <*LF*> (0x0A).

4.10 Synchronization

If two or more readers operate in close vicinity to each other, they have to be synchronized.

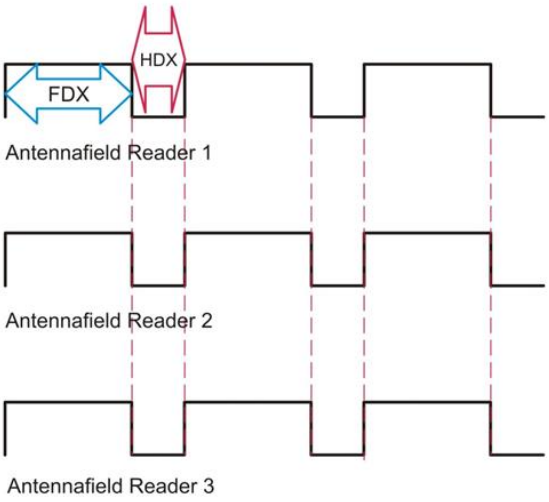
The example on the right shows that the readers are not synchronized. If reader 1 tries to read an HDX tag when the field is switched off, it might fail in this scenario. The reason is that readers 2 and 3 have their fields activated at this time; that means, they transmit on the same frequency like the HDX trans-ponder – but with much more power. If the unsynchronized readers are too close to each other (up to 50 meters, depending on antenna size and orientation), they will not be able to pick up an HDX transponder signal – at least not at the maximum possible distance.



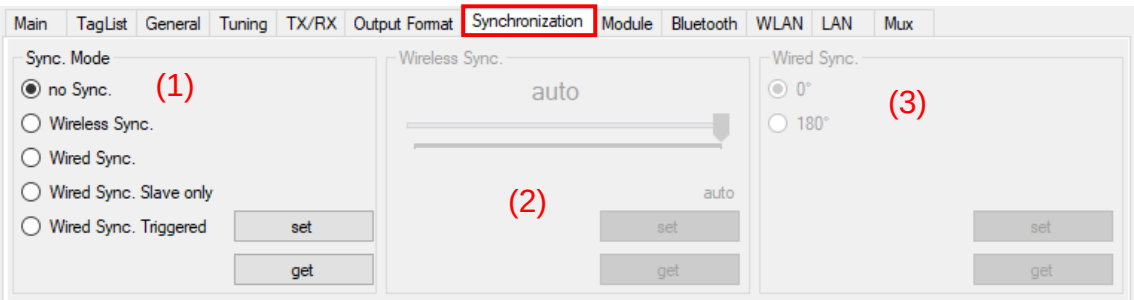
The solution for this problem is ‘Synchronization’. There are particular mechanisms which ensure that the timing of several readers is strictly synchronized.

In this example the ASRs are synchronized. The field on / off cycles are synchronous. There is always **one** Sync. Master, all other ASRs are Sync. Slaves.

Since all readers have the HDX-listening period at the same time, there is no more interference between the fields and the transponder signal can be picked up.



Please open the '*Synchronization*' tab in order to set up the reader for synchronizing.

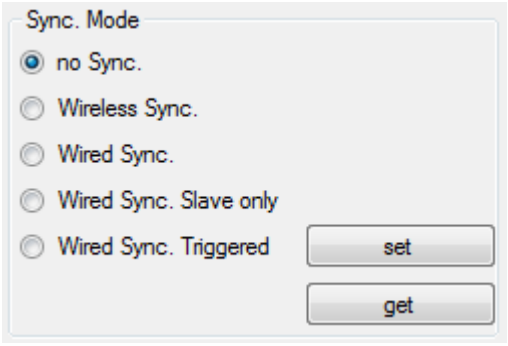


Per default, synchronization is disabled. If '*Wireless Sync.*' is not selected in the '*Sync. Mode*' (1) section, the advanced Wireless Sync. Settings (2) are greyed out and thus not available. The settings for '*Wired Sync.*' (3) are only available when either '*Wired Sync.*' or '*Wired Sync. Slave only*' is selected in the '*Sync. Mode*' (1) section.

4.10.1 Sync. Mode

There are five different settings possible:

- no Sync.
- Wireless Sync.
- Wired Sync.
- Wired Sync. Slave only
- Wired Sync. Triggered



4.10.1.1 No Sync. Mode

Using this setting, which is also the factory default value, the ASR will not 'listen' to any other readers but will independently decide when to activate and deactivate the RF-field. As long as there are no other stationary readers in close proximity, this setting can be used without any problems.

All Allflex portable readers support '*Wireless Synchronization*'. This is necessary because you cannot use Sync. cables for portable readers. In order to allow the Wireless Sync. for Handheld devices working as good as possible, it is highly recommended to set the ASR to a fixed timing of **50:20ms** – if there are no other reasons which would speak against that.

4.10.1.2 Wireless Sync. Mode

The ASR is capable of doing '*Wireless Sync.*' as well. This does also work, if you have several readers close together, not only two. In order to use '*Wireless Sync.*', you have to activate this option as Sync. Mode setting first.

In Wireless Sync. Mode, the readers decide independently which ASR is the Master. If the Master reader stops working, another reader will automatically take over the role of the Sync. Master.

More details about this option will be explained in chapter 4.10.2 – '*Wireless Sync. Level*'.

4.10.1.3 Wired Sync. Mode

The ASR can also perform Wired Synchronization. The disadvantage, compared to the Wireless Sync., is that you have to run cables between all readers you want to synchronize. But there are also advantages: Wireless Sync. implies a quite stable RSSI, i.e. the successful function of Wireless Sync. depends on the background noise. If there is a strongly varying noise level, the wireless method might fail. So, for applications, which require 100 percent reliable synchronization, that works completely independent of any noise levels, it is recommended to use Wired Sync.

In Wired Sync. Mode, the readers decide independently which ASR is the Master. If the Master reader stops working, another reader will automatically take over the role of the Sync. Master.

The required hardware for wired synchronization is not available on the reader board per default. It needs an add-on module for this purpose. For details about the Wired Sync. Module ('*ASY100*'), please see separate synchronization manual or contact your local Allflex representative.

4.10.1.4 Wired Sync. Slave only

This Sync. Mode is the same as '*Wired Sync.*' but with the difference that the reader will never take the role of the Sync. Master. The Sync. pulses need to come from an external source, like a customized controller. Alternatively, one ASR could be configured to '*Wired Sync.*' but when this device fails, all readers configured to '*Wired Sync. Slave only*' will stop reading.

4.10.1.5 Wired Sync. Triggered

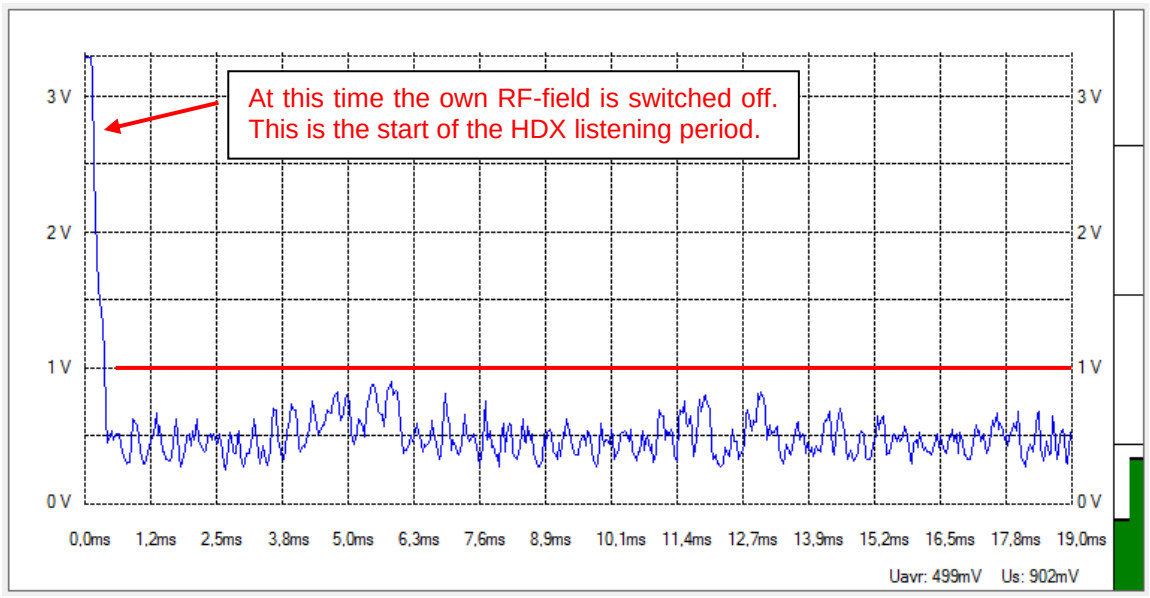
When this setting is activated, the reader will also wait for Sync. pulses from a Master unit but the Sync. signal is a different one. For further details please refer to the synchronization manual.

4.10.2 Wireless Sync. Level

How does wireless Sync. work?

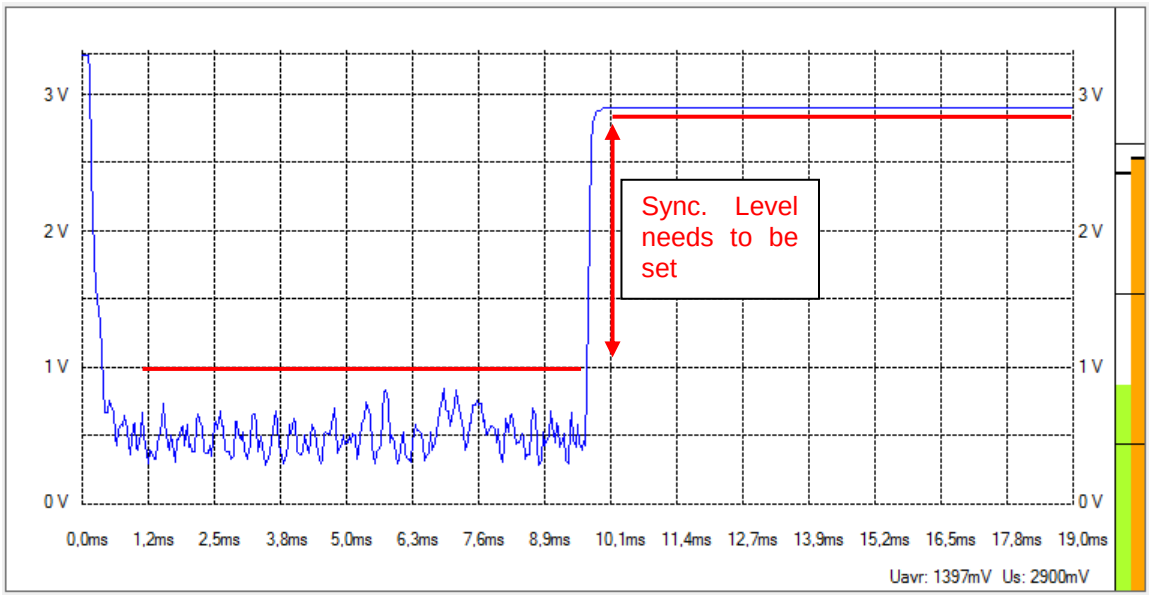
During the HDX listening period, the ASR is able to evaluate the so called RSSI level. RSSI means: **R**eceived **S**ignal **S**trength **I**ndication. You might already know this term from other radio technologies like WLAN. If another reader is activating its RF-field during the HDX listening period of the reader we are currently looking at, the ASR650 will take this 'rising edge' in the RSSI as the reason, also to activate its own RF-field immediately.

Although the integrated diagnosis function is not explained in detail in this manual, we will have a look at some RSSI samples. If necessary, please refer to the Integrated Diagnosis Function manual first.



In a 'noise-free' environment, the RSSI should be 1 Volt or lower like in the screenshot above.

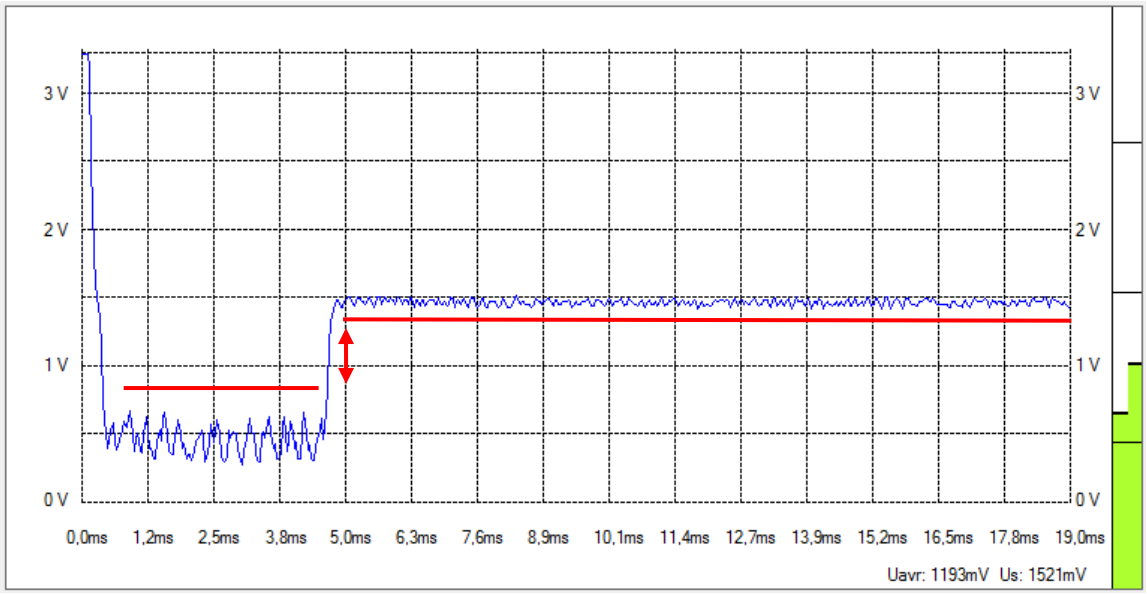
The following sample shows the rising edge in the RSSI, caused by another stationary reader that just activated its field.



What the ASR requires in order to make the correct decision is a particular Sync. Level. The level needs to be set higher than the highest peak in the 'background noise'. So, in our example it would be okay to set the Sync. Level to approximately 1V. You might also set it higher but then you decrease the sensitivity of Wireless Sync. A level of about 3 Volts would make no sense at all since the 'other' reader does not pass 3 Volts.

If you want to select a Sync level manually, your value should always be only a bit higher than the maximum background noise. This ensures that the ASR will also synchronize to readers which are further apart. The Sync. Level is comparable with the 'Trigger Level' of an oscilloscope.

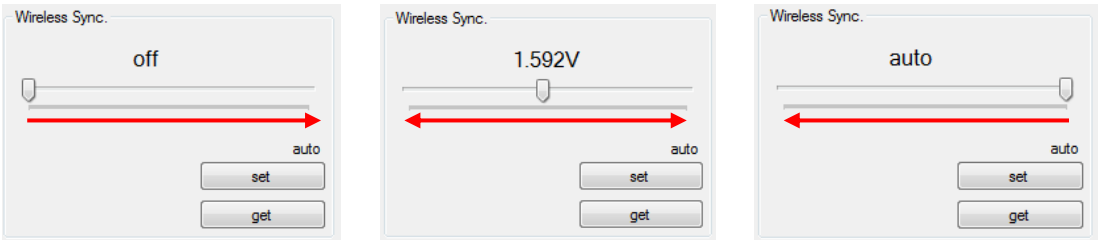
In the next example the 'other' reader seems to be further apart because the signal rise in the RSSI is smaller.



If you would select a Sync. Level of 1.5 Volts or even higher in this case, Wireless Sync. would never work because the signal, caused by the other reader, never reaches 1.5 Volts.

Fortunately, the ASR also offers an automatic Sync. Level detection which works really reliable. In this case the reader always evaluates the changes in the background noise and tries to set the lowest possible Sync. Level on its own.

If you do not know exactly what you are doing with the manual configuration, it is highly recommended to use the automatic Sync. Level detection in order to avoid unnecessary malfunction of the Sync. mechanism.



Use the slide control for selecting a Sync. Level and press '*set*' in order to send the setting to the reader. You can request the currently configured level via '*get*'.

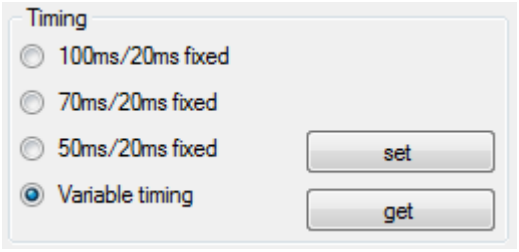
If the slide control is on the left side, Wireless Sync. is off. The slide control on the very right side means Sync. Level auto detection. All values in between are valid voltages.

Wireless Sync. can only work with a fixed timing. The ASR can either use 50:20ms, 70:20ms or 100:20ms.

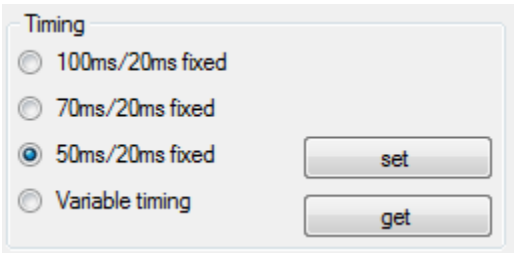
The Sync. timing is set via '*Timing*' in the '*General*' tab as well.

Since the '*variable timing*' is not allowed in case of using Wireless Sync., the reader will use a fixed timing of 50:20ms if variable timing is set in combination with Wireless Sync.

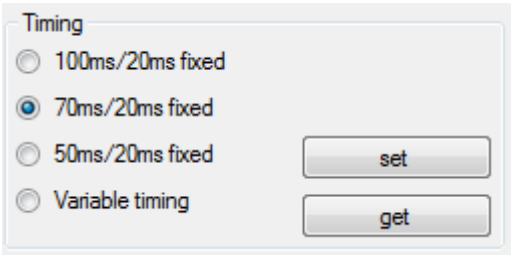
So, if Wireless Sync. is activated, the settings in the '*Timing*' section work as follows:



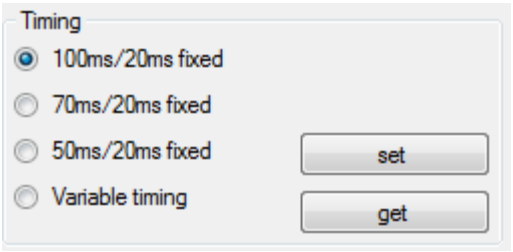
The ASR will use a fixed timing of 50ms field activation and 20ms field off.



The reader will use a fixed timing of 50ms field activation and 20ms field off.



The ASR will use a fixed timing of 70ms field activation and 20ms field off. The exception is every 10th cycle, which is 50:20ms. This allows wireless synchronizing Handheld readers to detect an HDX tag every 880 milliseconds (9x90ms + 70ms).



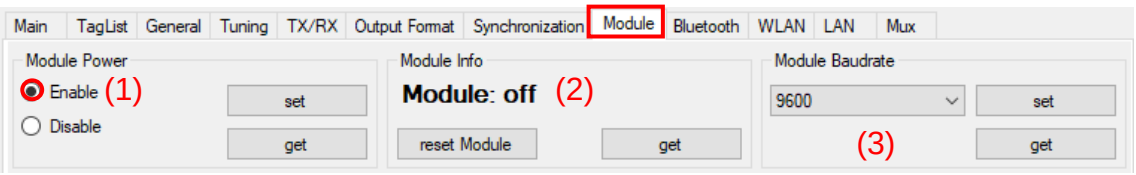
The reader will use a fixed timing of 100ms field activation and 20ms field off. The exception is every 10th cycle, which is 50:20ms. This allows wireless synchronizing Handheld readers to detect an HDX tag every 1150 milliseconds (9x120ms + 70ms).

4.11 Module

The ASR650 offers optional communication add-on modules such as:

- Bluetooth (Class 1, up to 100 meter range, Master capable)
- Ethernet

The tab 'Module' provides some basic settings and information regarding these add-on modules.

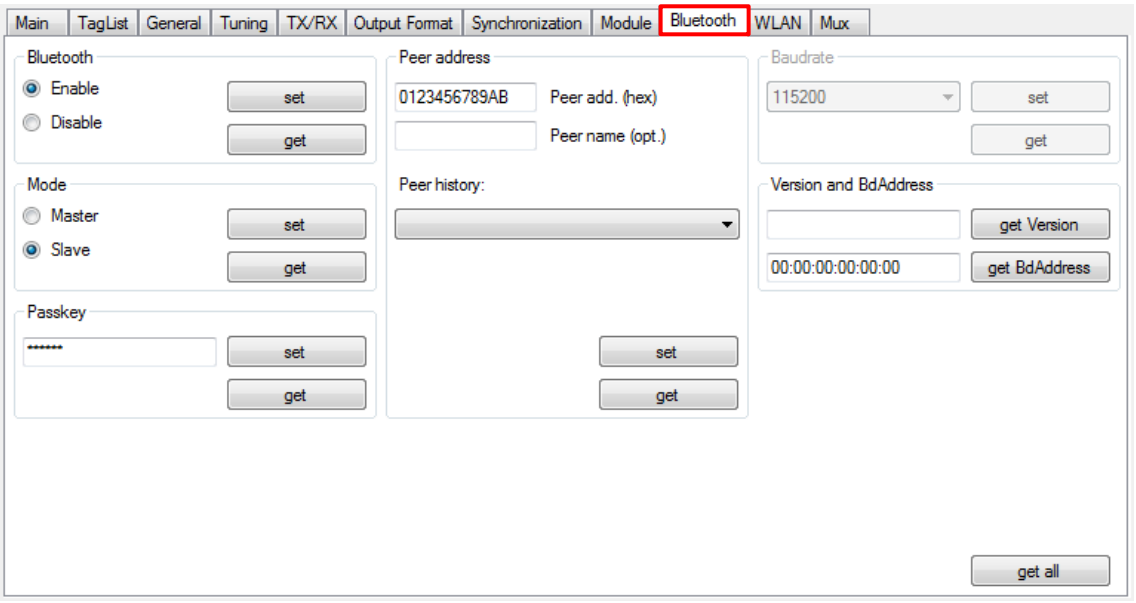


Before one of the add-on modules can be used, please ensure that '*Module Power*' is not disabled. Per factory default settings, module power is enabled.

Depending on the module type, the detection can take a while after the reader was switched on. In case the reader detected the module type successfully, the model is shown in the section '*Module Info*' (2). The default '*Module Baudrate*' is '*9600*'. It can be configured up to a maximum of 115200bps (3).

4.12 Bluetooth

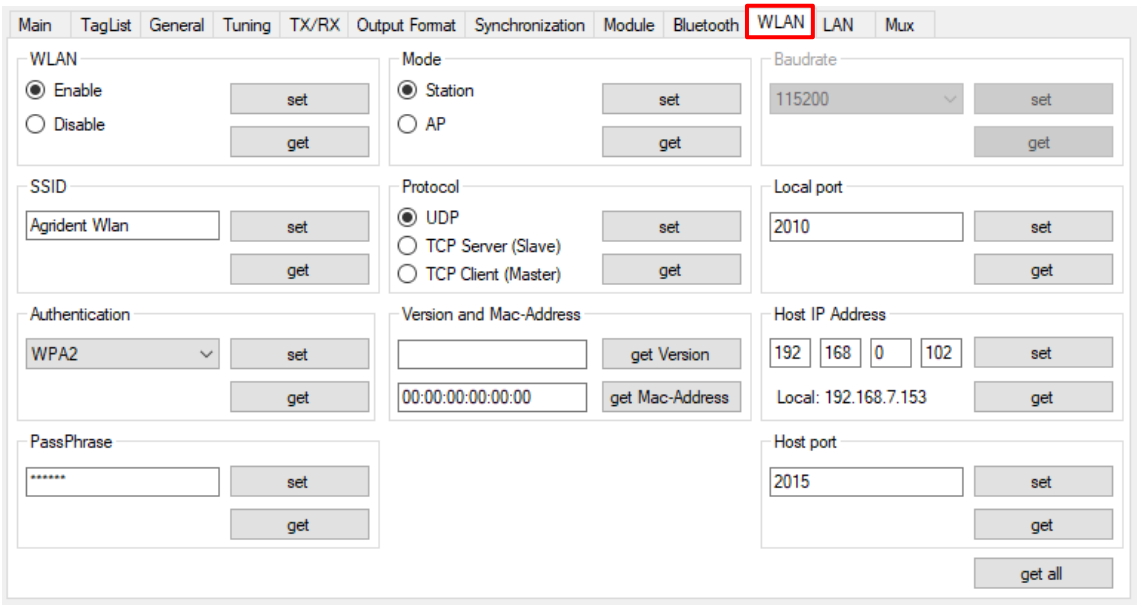
In case your ASR is equipped with the optional Bluetooth module, the appropriate settings can be applied or requested here.



Since the Bluetooth module is not part of the reader board but optional hardware, the configuration is explained in the ASR Bluetooth manual.

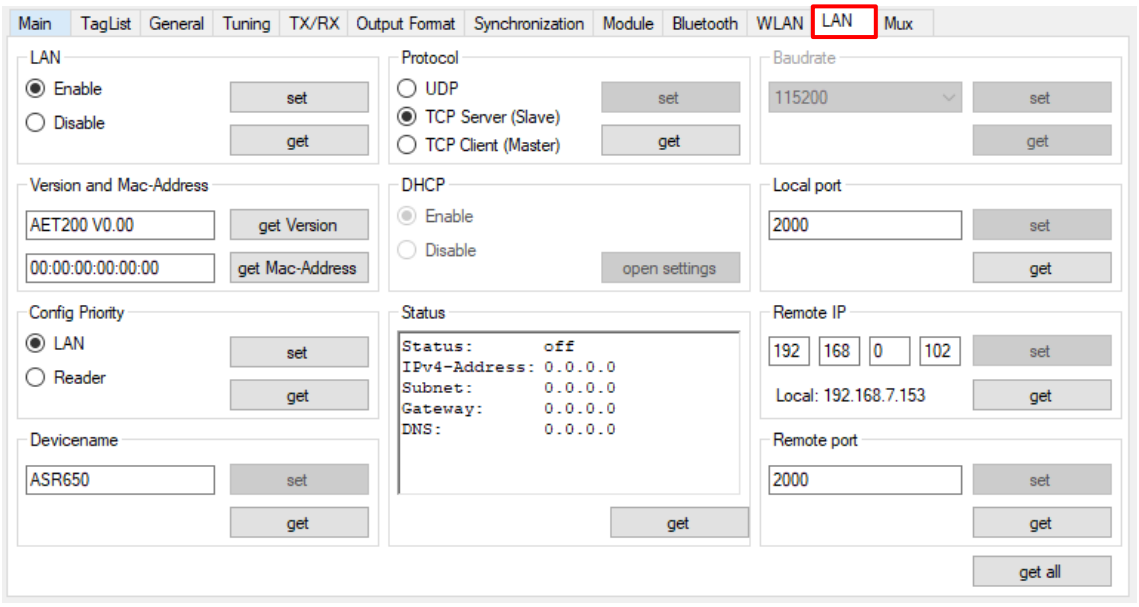
4.13 WLAN

Even though the WLAN module for the ASR550/ASR650 has been discontinued meanwhile, it is still possible to configure the WLAN settings using *ASR-PC-Demo*.



4.14 LAN

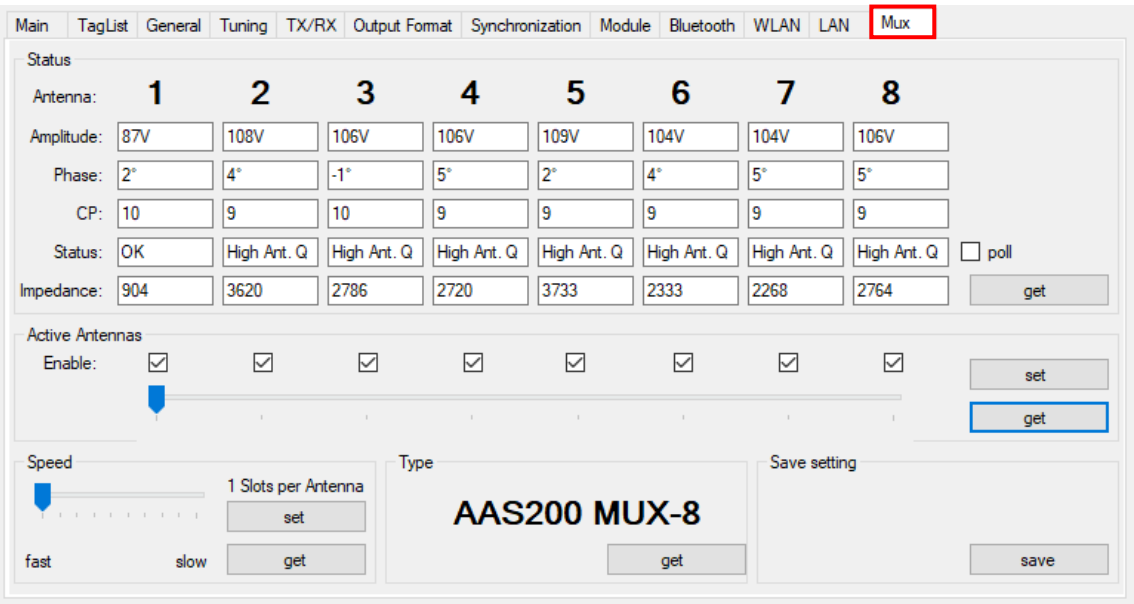
If your reader is equipped with the optional Ethernet module 'AET**2**00', the appropriate settings can be applied or requested here. It is not possible to configure the 'AET**1**00' via *ASR-PC-Demo* – this only works via the web interface.



Because the AET200 module is not part of the reader board but optional hardware, the configuration is explained in the separate AET200 manual.

4.15 Mux

The Antenna Multiplexers for the ASR series allow using the reader with up to eight antennas with a single reader. The different antennas are used one after the other in this scenario – not all at the same time. The Multiplexer settings and information can be found in the tab '*Mux*'.



Since the Multiplexer boards are optional accessories, the technical details will not be described here. Please see the ASR antenna multiplexer manual for details.

5 Safety and care

The manufacturer accepts no liability for damage resulting from improper use or use not consistent with that described in these operating instructions.

- The ASR650 Reader contains no parts that can be repaired by the user. For this reason, the Reader Electronic may only be repaired by authorized customer service personnel.

- In both, operation and storage of the reader, please secure to comply with the environment conditions specified in the technical data.

Any modification to the ASR650 Reader will render the warranty null and void.

6 Warranty

The manufacturer of the ASR650 Reader will provide a warranty of

12 months

from the day the device is shipped and subject to the following conditions:

a. Without submission of proof of purchase no warranty can be given.
b. In the event that defects are detected, the manufacturer is entitled to choose between up to two attempts at repair or supplying a replacement device on one occasion. The warranty period for the repaired item or for a replacement item is 3 months but will always extend to the end of the original warranty period. No further claims can be entertained, especially claims for compensation for consequential losses. This exclusion of liability does not apply to claims made on the basis of the Product Liability Act.
c. Warranty claims cannot be entertained unless the Allflex system was installed properly and used properly and for the purpose intended.

No warranty obligations exist in particular when:

1. Damage is attributable to improper use of the device, to an incorrect connection or incorrect operator action;
2. The device was not cared for and maintained in accordance with the manufacturer's recommendations and this is the cause of the damage;
3. The damage is due to any modification to the device;
4. The damage is due to force majeure, for example, lightning strike;
5. The damage is due to wear resulting from overstressing mechanical parts.

7 CE MARKING

Hereby, Allflex GmbH declares that this equipment, if used according to the instructions, is in compliance with the essential requirements and other relevant provisions of the Radio Equipment Directive (RED) 2014/53/EU. For use in all countries of the EU.

The product comes with the simplified version of the 'Declaration of Conformity' (DoC) as described in article 18 of the RED (2014/53/EU). The full text of the EU DoC is available at the internet address referred to in the simplified DoC.

In case of alteration of the product, not agreed to by us, this declaration will lose its validity.

This symbol indicates proof of conformity to applicable European Economic Community Council directives and harmonized standards published in the official journal of the European Communities.

CE

8 FCC and IC digital device limitations

This device complies with Part 15 of the FCC rules. 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.

FCC Interference Statement (Part 15.105 (b))

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Part 15 Clause 15.21

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

9 Trouble shooting

For any problem please contact us:

Telephone +49 5105 582573-10
FAX +49 5105 582573-17
E-mail allflexinfo@msd.com