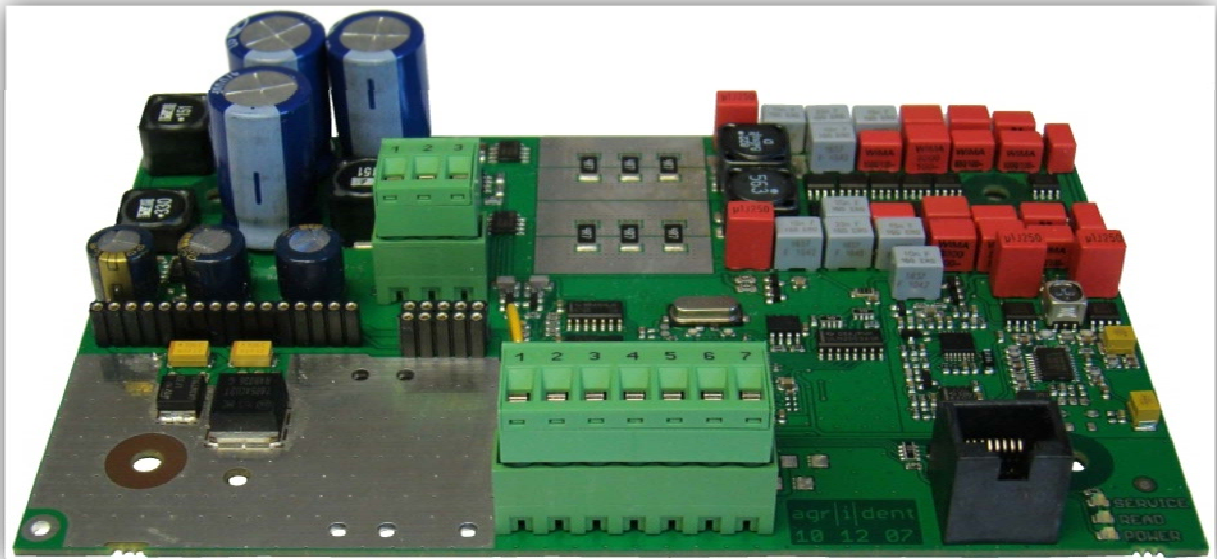




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ASR550 Stationary Mid-Range Reader



V05/11/13

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Torsten Bade, Technical Support

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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. There are separate manuals for the ASR565 and ASR566, which do not contain that much technical information.



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.

This device has to be installed by qualified personal only.

1.1 Definition of terms

Explanation of abbreviations used in this manual

RF:	Radio Frequency (in this case the long-wave band)
RFID:	Radio Frequency Identification - 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 HF 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 HF 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 antenna and the environment.

The following things may influence the reading range:

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

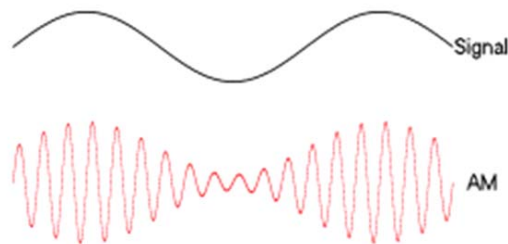
The ASR Demo-Software includes tools for checking the tuning state of the antenna and the environmental noise.

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.

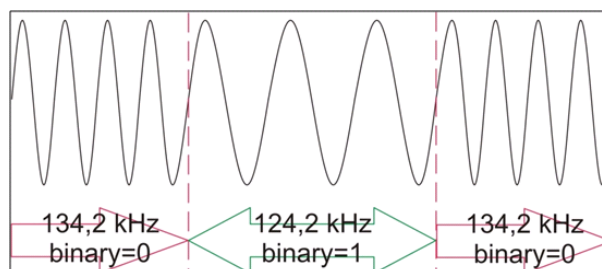
1.3.1 FDX-B

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



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

Agrident provides a range of different antennas options for the ASR550.

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 values which are important in order to guarantee the best possible reader performance. Depending on quantities, customized antenna designs are possible.



Please contact your local Agrident 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



Agrident 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 the ASR550, the warranty becomes null and void!

2.1 Important notes regarding reading performance

In order to achieve the best possible performance with your ASR550, 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 PC-Demo Software can also provide useful information for checking the influence of metal.

2.1.2 Antenna position regarding other electric equipment

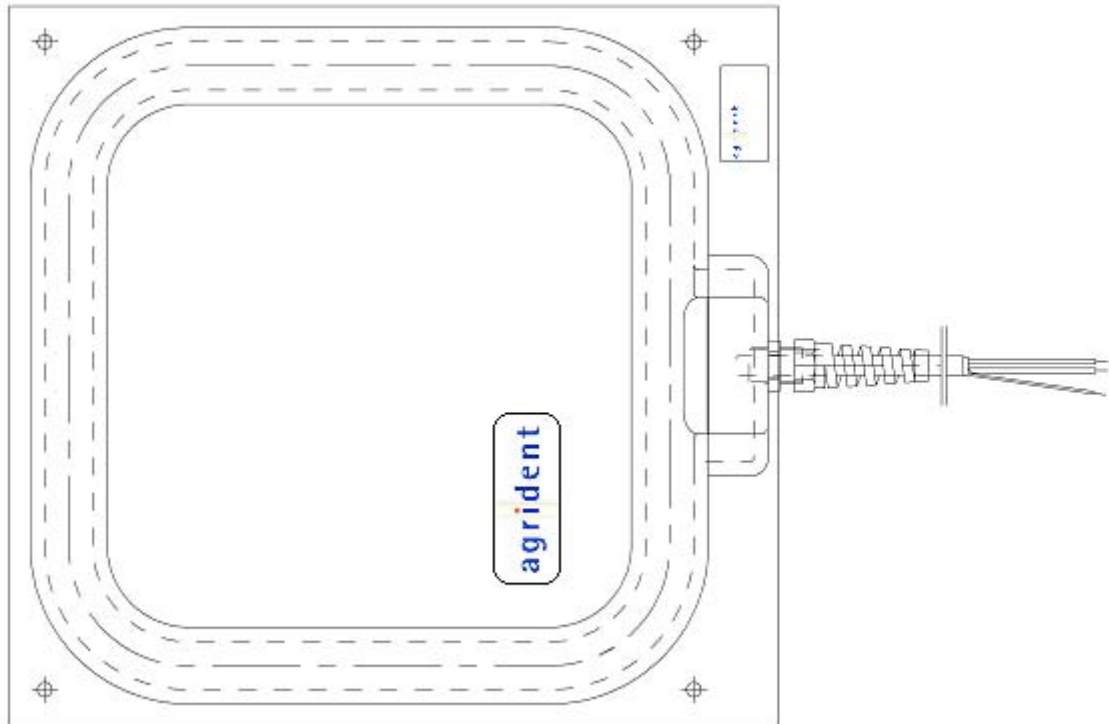
The antenna - as a fundamental part of the complete RFID system - also receives the transponder signals. These signals are very small since the transponders transmit passive. Although lots of other electric and electronic devices are not supposed to be radio devices, i.e. to transmit any signals over the air, they do that nevertheless. 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 bad 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 meter, which are not synchronized

2.1.3 Installing the antenna

The following drawing shows the APA003 panel antenna.



To fasten 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.



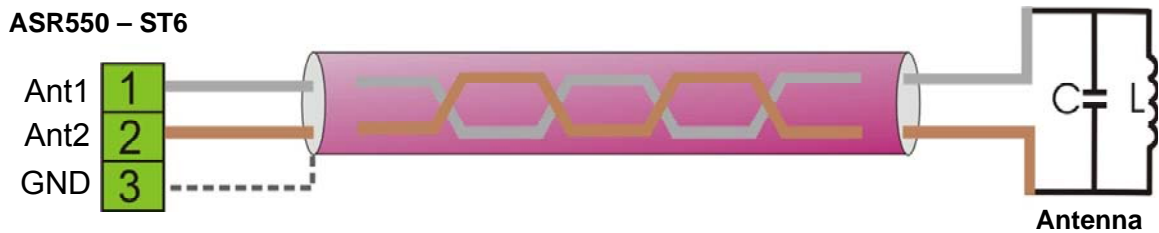
Please ensure that the antenna and the antenna cable do not interfere with movements of animals or persons close to the system. The antenna cable should be fastened with cable ties or it should be inside protective pipes. Please consider mechanically moving parts (like gates) very carefully. Do not fix 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 ST6 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

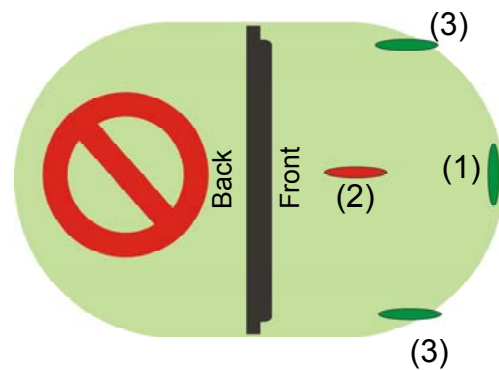
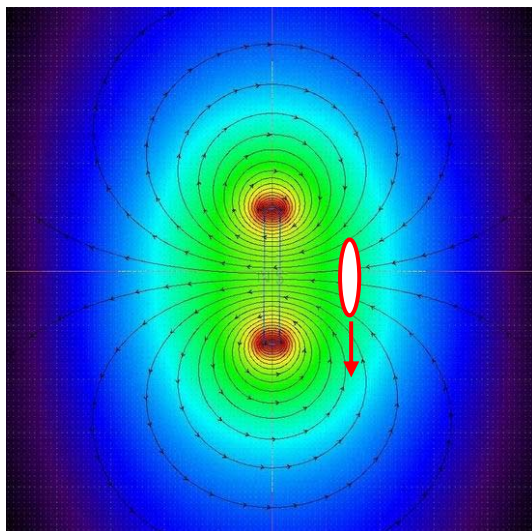
Agrident is only using these two types of antenna cable. If you are using third party antennas, the colors of the antenna cable wires might vary.



We highly recommend to use low capacitance antenna cable (twisted), like TWINAX AWG 2x20 (IBM Nr. 7632211) or IGUS Chainflex CF11.05.01.02.LC.D (very flexible, also at low temperatures but more expensive).

2.1.5 Field Distribution

1. Single Antenna

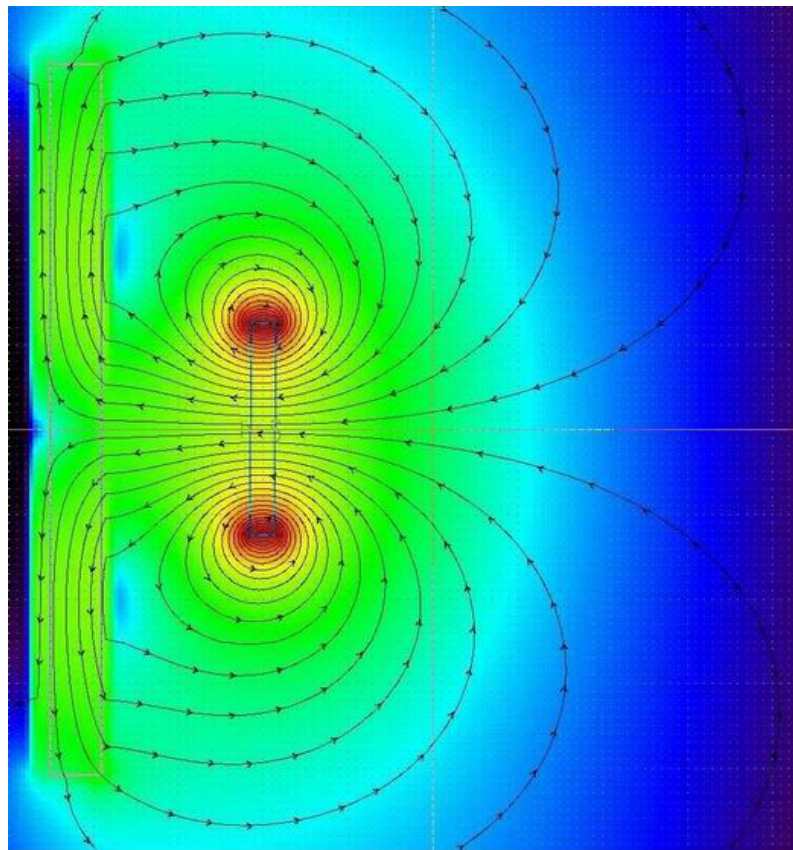


The left picture shows the field distribution and lines of flux for a single antenna. This leads to **optimum** and **worst** reading orientations. Generally speaking, the transponder coil should be in 90 degrees to the field lines in order to achieve the best reading range.

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 time – 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 APA006, 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.

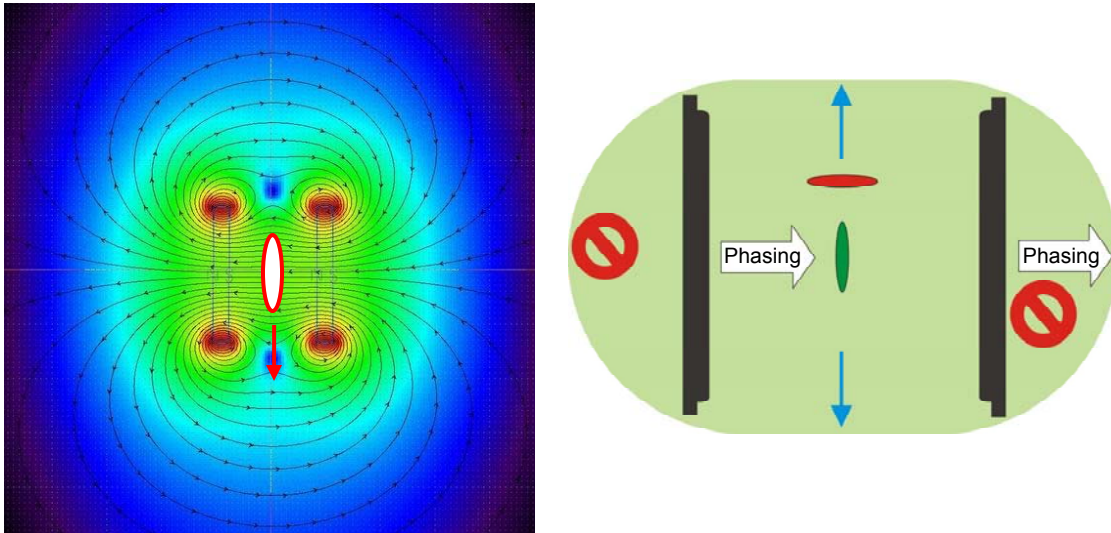
It is important that the metal plate has at least twice the size of the antenna coil in order to allow good shielding. The material of the plate can be stainless steel, for example.

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 ASR550 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:

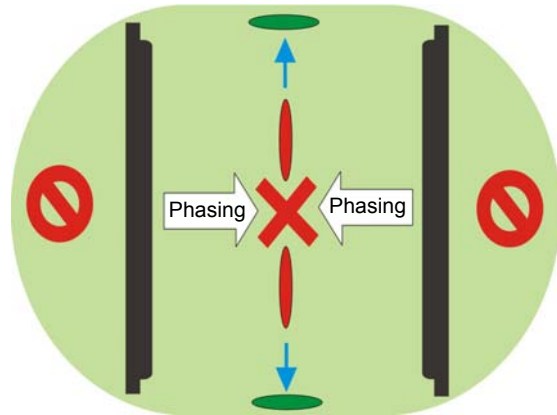
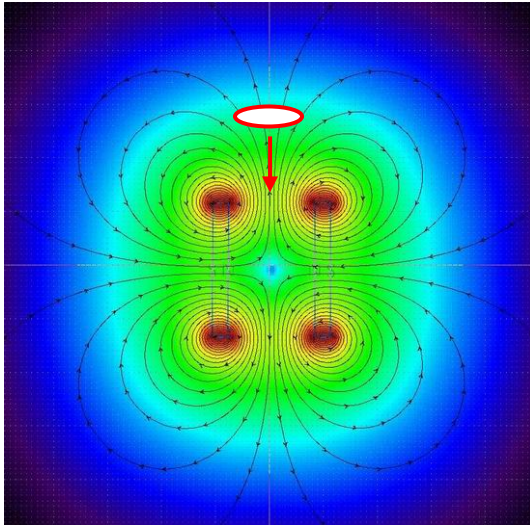


In this setup the antennas are “in phase”. This is also called parallel- or Helmholtz antenna. The optimum tag orientation is similar to the one of the single antenna (transponder coil parallel to the panels). The reading distance can be significantly increased compared to a single antenna. In addition, 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 APA006 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 big 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. This could lead to several transponders in the field at the same time and thus to data collision – so the reading zone should be figured 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.

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 ASR550 is a stationary reader designed for reading both ISO relevant transponder technologies: FDX-B and HDX. It is operating on 134.2 KHz and can read passive tags as defined in ISO11784/11785 at a very good reading range. Combined with one of our antennas, the ASR550 provides a flexible and universal RFID system.

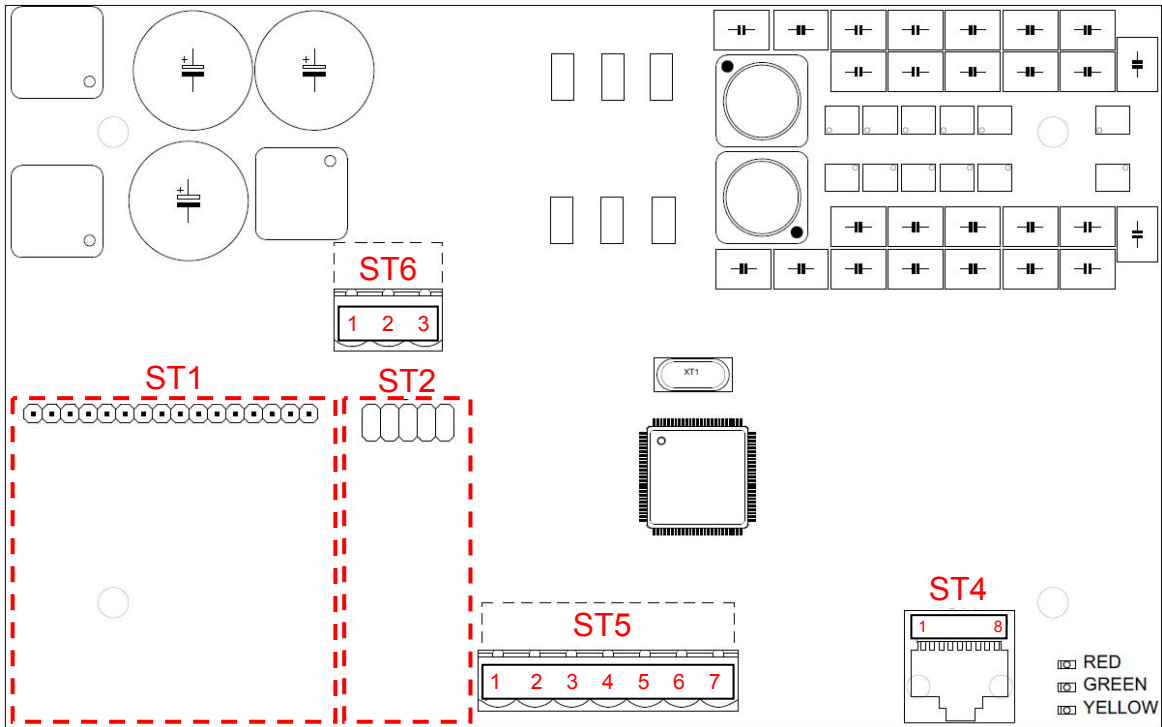
The reader board consists of the power supply, the transmitter (including patented Autotuning function), two separate receivers (for FDX-B and for HDX), a microcontroller and two interfaces (RS232 and RS485). The ASR550 additionally offers an interface for add-on modules like Bluetooth, Wi-Fi or Ethernet. This Add-On socket can also be used for connecting an antenna multiplexer. The optional wired Synchronization module can be attached to another connection strip.

3.1 Specifications

Item	Specification
Power Supply	12V DC to 24V DC (+/- 5%)
Operating Frequency	134.2KHz
Reading Range	HDX: up to 90cm FDX-B: up to 75cm with antenna APA006 (50x60cm)
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: <ul style="list-style-type: none"> ■ Bluetooth Class 1 (Master capable) or ■ Wi-Fi or ■ Ethernet
Indicators	Onboard LEDs: <ul style="list-style-type: none"> ■ 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 = 13,5µH, Capacitance = 100nF
Memory	In combination with Handheld APR500 via RS232 or Bluetooth (Race Mode)
Display	In combination with Handheld APR500 via RS232 or Bluetooth (Race Mode)
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 ASR550

The following picture shows the ASR550 circuit board:



Connector	Function
ST1	Socket for Add-On Module (Bluetooth, Wi-Fi, Ethernet or Multiplexer Adapter)
ST2	Socket for Wired Sync. Module
ST4	Connector for external LED board (RJ45)
ST5	Connector for DC power supply and RS232 / RS485 interface
ST6	Connector for Antenna

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

The ASR550 uses the “Phoenix Combicon” series for the Antenna and Power Supply / 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 ST5 – Connector for DC Power Supply and Interface

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

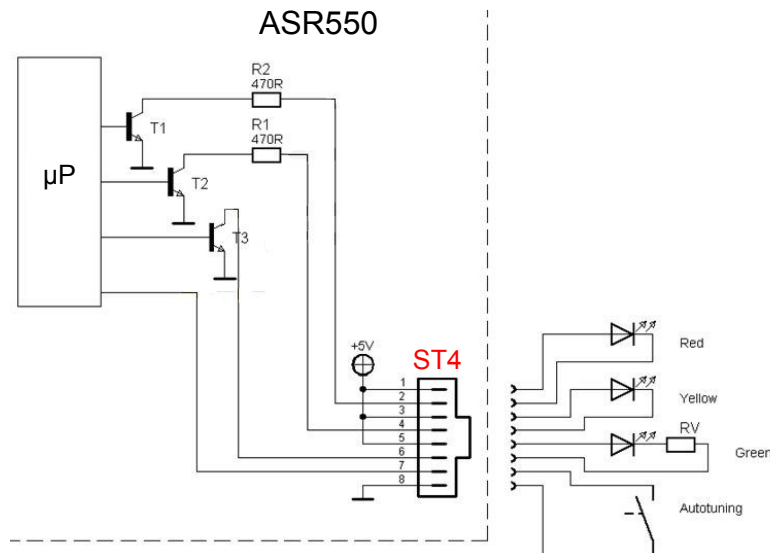
3.2.2 ST6 – Antenna Connector

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

3.2.3 ST4 – Connector for external LED Board

The ASR550 provides an RJ45 plug for connecting an external LED board. You can also purchase an external LED board from Agrident, which contains an additional buzzer for audible indication of a successful tag read.

Pin	Function
1	+5V
2	Output Red LED (open collector with R = 470Ω)
3	+5V
4	Output Yellow LED (open collector with R = 470Ω)
5	+5V
6	Output Green LED (open collector without R)
7	Input for auto tuning switch
8	GND



The external LEDs have the same functions like the on-board LEDs.

3.3 Signalization

The ASR550 has 3 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. In addition the LEDs are used for showing other 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 ASR550 will also disable the transmitter if the antenna inductance and / or the antenna impedance are completely wrong.

3.4 Power Supply Requirements

You might use power supplies between 12 and 24 Volts DC for the ASR550. It is very important that these power supplies have low ripple and noise ($50\text{mV}_{\text{PeakPeak}}$ or less). Agrident highly recommends using linear regulated power supplies (stabilized). Switch-Mode power supplies can decrease the reader 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 automotive battery but please note that the ASR550 will shutdown the transmitter if the input voltage sinks below 11.0 Volts.

The power supply should be able to deliver 1.5 Ampere per reader at 12 Volt DC since the maximum input current can be 1 Ampere. For higher input voltages the 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 0.5mm^2 . The minimum input voltage for the reader is 11.0 Volts and the maximum possible current 1 Ampere. So the maximum allowed voltage drop is 1.0 Volt and thus the maximum allowed cable resistance is 1.0Ω .

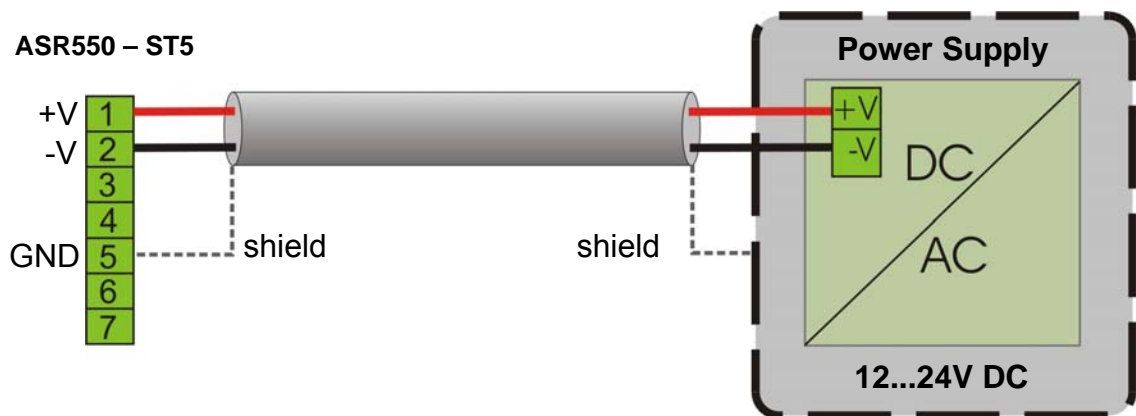
$V_{\text{PSU}} = 12.0\text{V}$ $V_{\text{In Minimum}} = 11.0\text{V}$ cable: 0.5^2 with $36\text{m}\Omega / \text{meter}$ $I_{\text{Max}} = 1.0\text{A}$

$$l_{\text{Max}} = \frac{(V_{\text{PSU}} - V_{\text{In}}) \div I_{\text{Max}}}{2 \times 0,036 \Omega/\text{meter}} = \frac{(12.0\text{V} - 11.0\text{V}) \div 1.0\text{A}}{2 \times 0,036 \Omega/\text{meter}} = \frac{1 \Omega}{0,072 \Omega/\text{meter}} = 13,88\text{m}$$

That means your power supply cable must be shorter than 13.8 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 (ST5-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 0.5mm^2 .

3.5 The RS232 Interface

One of the several possible interfaces of the ASR550 reader is the RS232. Although it might be a little bit old-fashioned in the consumer-electronic market meanwhile (lots of laptops 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.

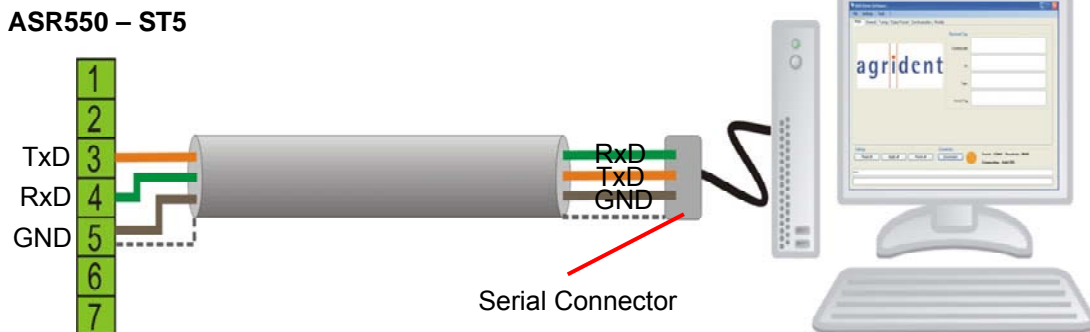
An RS232 interface needs at least three wires: TxD, RxD and GND.

- 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 ASR550 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 – ST5	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 ASR550 uses an RS232 circuit which disables itself, if it does not detect valid RS232 signals.

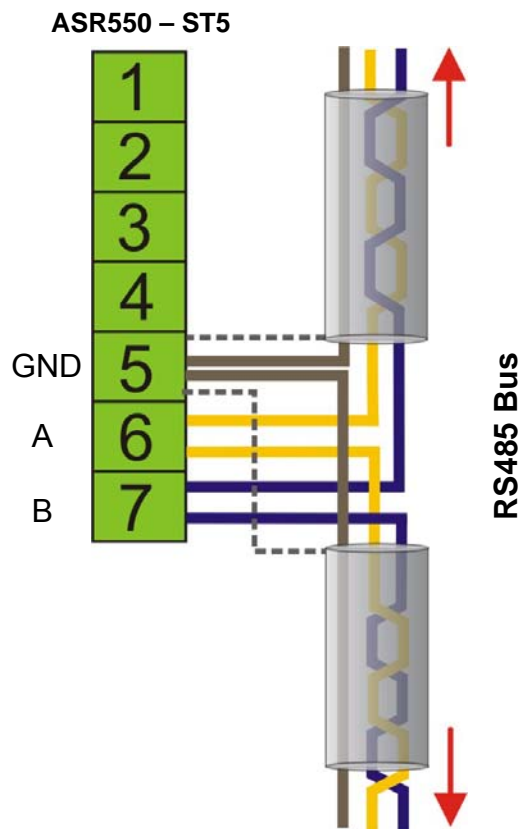


The maximum allowed cable length for RS232 is 12 meter according to the RS232 specification. This is because the maximum allowed cable capacitance at 19200 Baud is 2500pF. Using low capacitance cable might allow longer cables but please keep in mind that the critical cable length gets smaller as the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

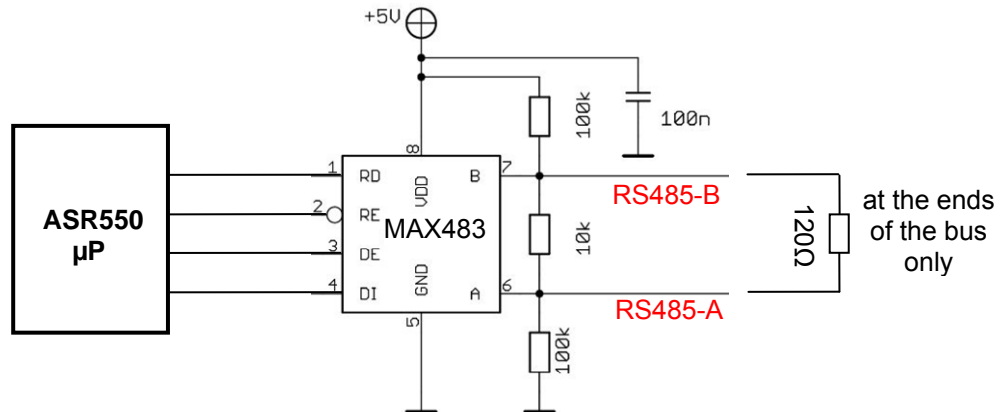
3.6 The RS485 Interface

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 ohms for twisted pairs).



The above drawing shows the RS485 schematic of the ASR550 including the fail-safe resistors. These 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 Agrident Demo Software.

4 ASR550 Settings

In order to allow the ASR550 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 Agrident provides a PC Demo-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 ASR550 protocol. Please see the ASR550 protocol description for details.

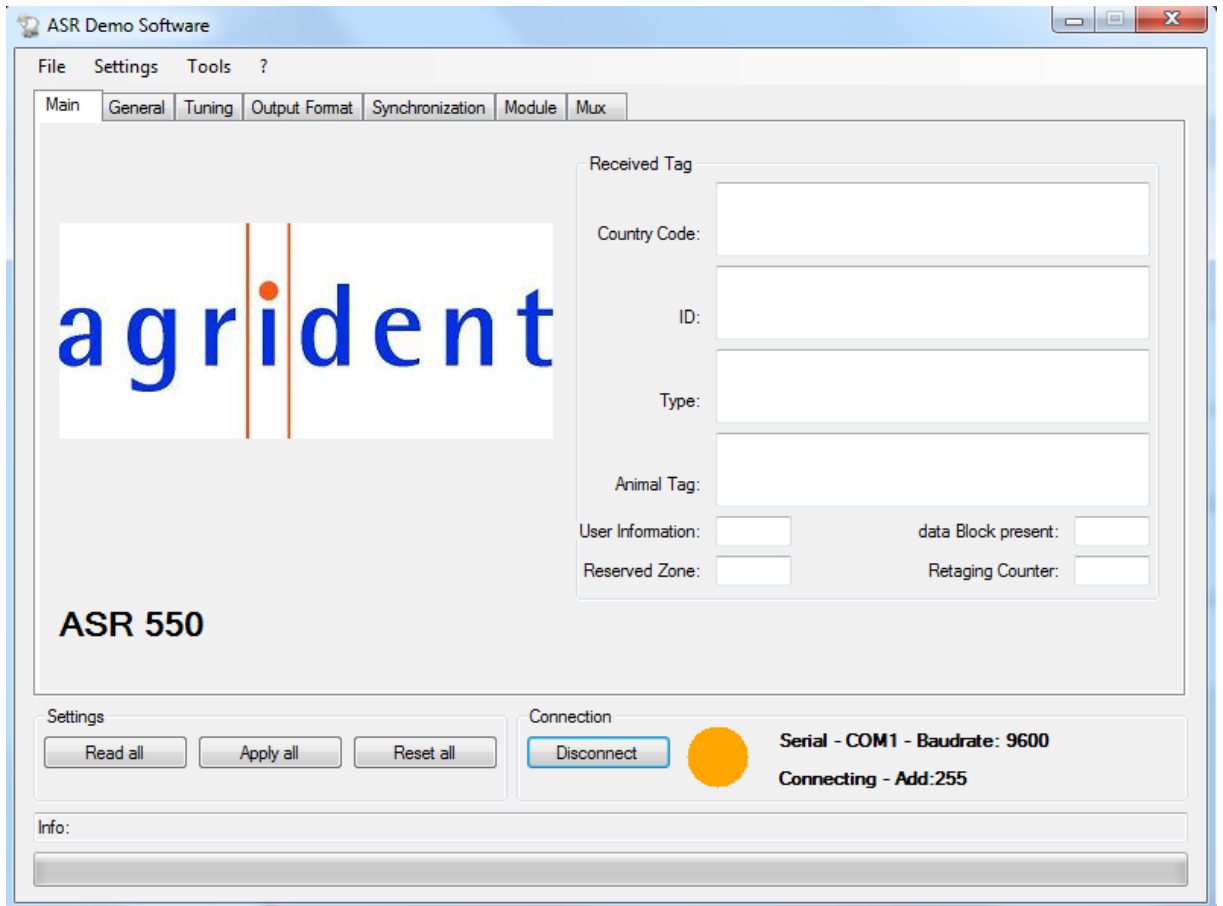
All the different reader settings will be explained in combination with the Agrident PC-Demo Software for stationary readers in the following chapters.

4.1 Installing the PC-Demo Software

Please start the setup file and follow the instructions in order to install the PC-Demo Software.

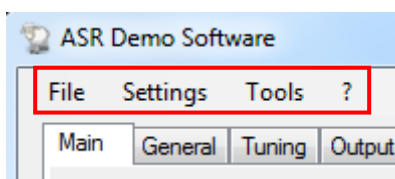
The Agrident PC-Demo Software is written in Visual Studio and thus requires the Microsoft .NET Framework Version 2.0 or higher.

4.2 Starting the PC-Demo Software



After starting the ASR550 PC-Demo Software, the following main screen appears.

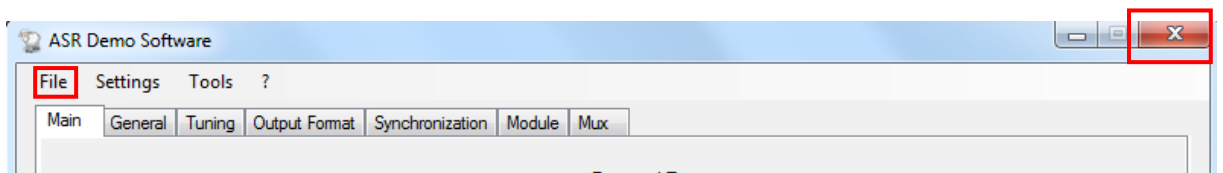
4.3 The File Menu



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 PC-Demo Software. Alternatively you might also close the program using the corresponding button in the upper right corner of the main window:

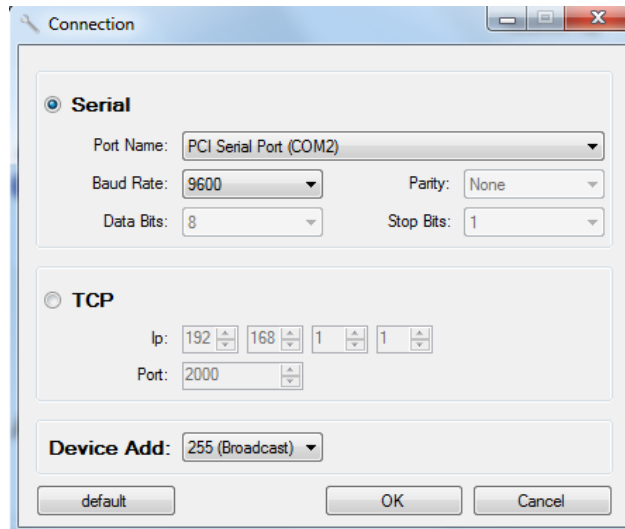


4.3.2 Settings

The file menu “Settings” contains the menu items “Connection”, “Device” and Log File”.

4.3.2.1 Connection

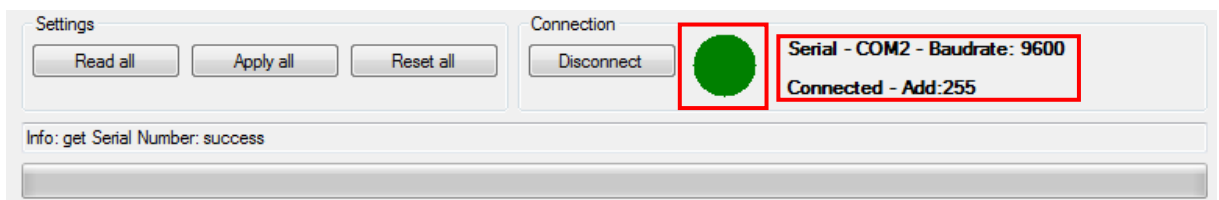
If you press “Connection” an additional window opens. Here you have to select the interface type and the corresponding settings.




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 ASR550 has to match with the selected baud rate of the PC-Software – otherwise the communication will not work. Per factory default, the ASR550s 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, the PC-Demo Software will use 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. 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.

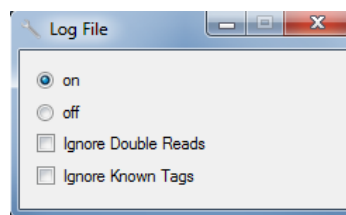
TCP/IP connections are only intended to be used if your ASR550 has an optional Wi-Fi – or Ethernet module. Please see the corresponding manuals regarding details about the TCP/IP configuration.

4.3.2.2 Device

This submenu allows choosing the stationary reader product you are using. The default setting is the ASR550, but “older” reader models are supported as well. If the Demo Software was connected to an Agrident Stationary Reader successfully, the reader type should be detected automatically. It makes sense to select the device manually if you want to evaluate diagnosis data “Offline”, i.e. with no reader connected. The ASR550 saves the diagnosis data (also tuning curves) different from the previous models ASR400, ASR500, ASR600 and ASR700.

4.3.2.3 Log File

If you press “Log File”, a small window opens:



Here you can decide whether the PC-Demo Software 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 Software folder each time you start the software. The option “Off” causes that no log file will be created. If you decide to save a log file, you also have the possibility to ignore double reads regarding the log.

1. Ignore Double Reads

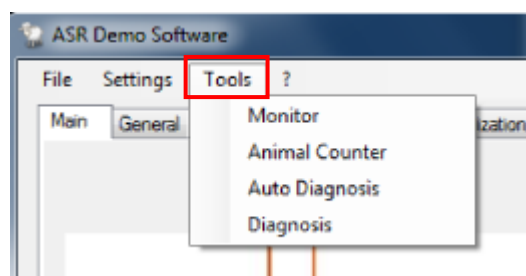
If the reader transmits one and the same ID again and again, it will be written into the log file only once if this checkbox is activated. If a different ID is read meanwhile, the previous ID will be added to the log again next time it is read. So “Double Reads” only refers to ONE transponder number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

2. Ignore Known Tags

If this box is checked, the PC-Demo Software will ignore all tags which have already been read since the program was started.

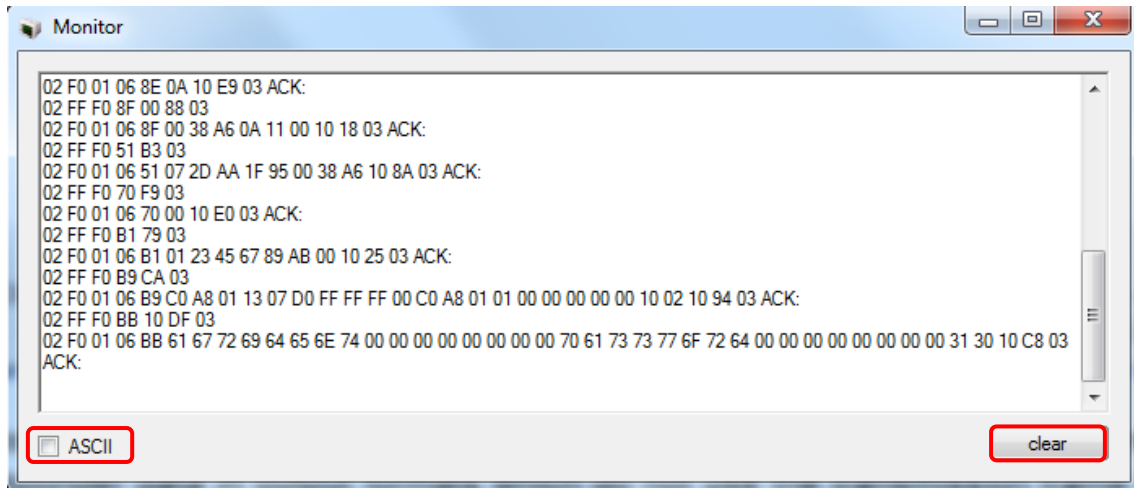
4.3.3 Tools

The section Tools contains the submenus “Monitor”, “Animal Counter”, “Auto Diagnosis” and “Diagnosis”.



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 their own software with the commands the Agrident PC-Demo Software is sending and receiving.

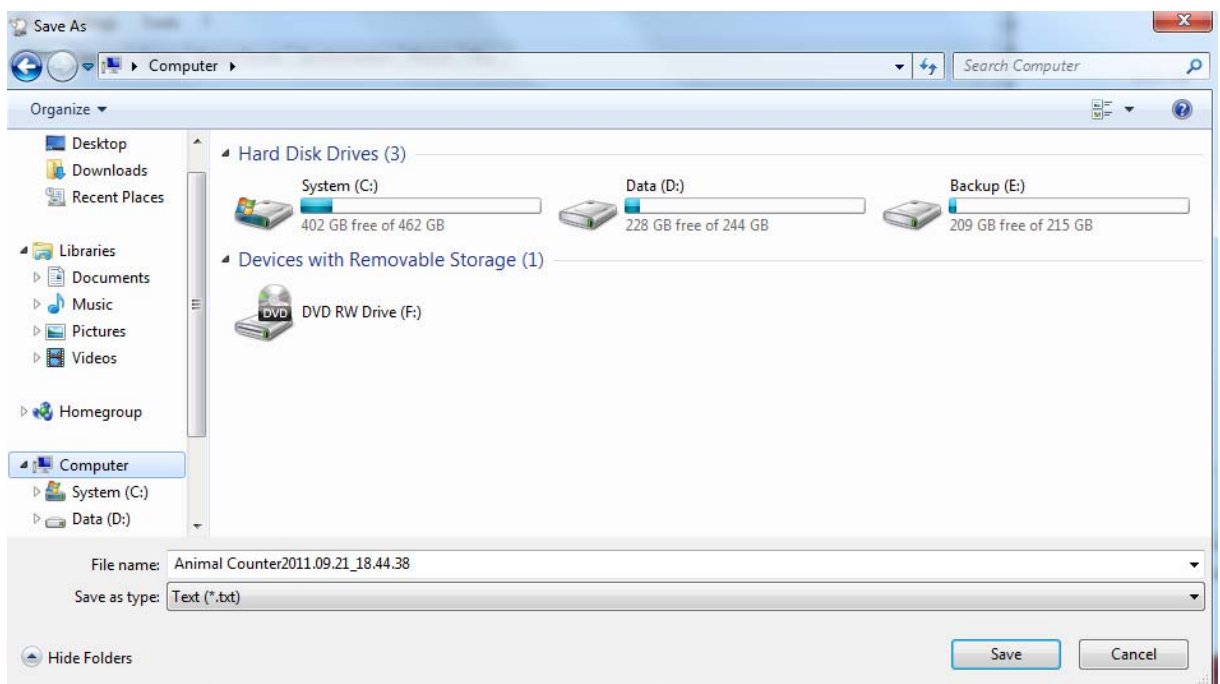


The communication might also be watched in ASCII format. This makes more sense for viewing the transponder data in output formats which do not use the transmission frame like the "Short ASCII" formats, NLIS, ISO24631 or the Custom Format. The button "clear" empties the window.

4.3.3.2 Animal Counter

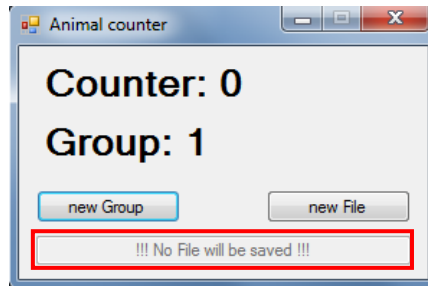
The Animal Counter works similar to the already mentioned log file with the option "Ignore Known Tags" activated. Nevertheless there are some differences.

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

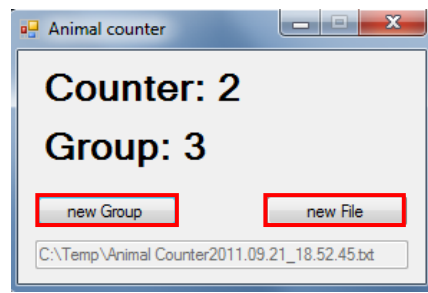


Please choose a folder where you want to save the file containing the read transponders to. The file will be saved as a text file with the default name "Animal Counter" followed by date and time. You might also change this default name, of course.

If you press “Cancel”, the Animal Counter is started anyway but no file will be saved. This information is also displayed in the Animal Counter window.

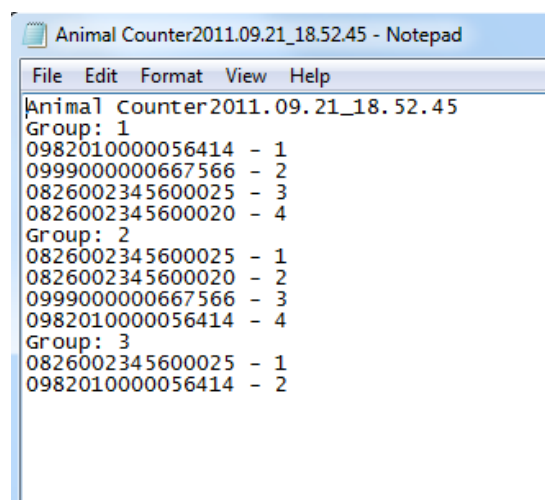


If you decided to save a file, the path will be displayed. When you are reading transponders now, the counter is increased as soon as a new, unknown, tag has been read. In addition they will be written into the corresponding text file.



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 this example:



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

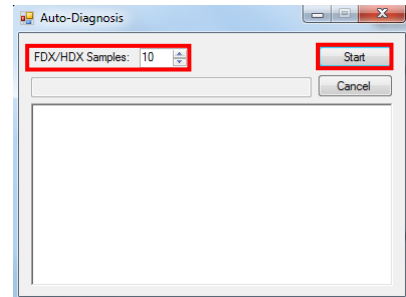
4.3.3.2.1 Auto Diagnosis

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

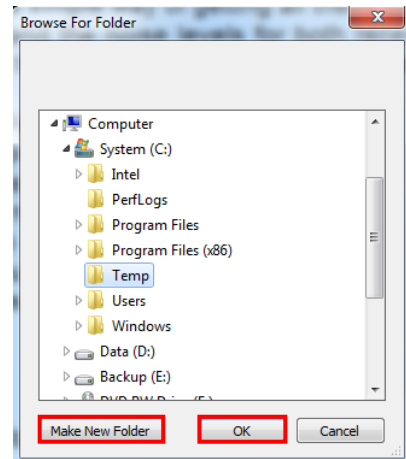
1. Wrong antenna tuning, maybe even in combination with too much metal close to the antenna.
2. Electromagnetical interference – often referred as “noise”.

The ASR550 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-technical people, there is a simple way of getting all these data – the Auto Diagnosis. It stores a complete tuning curve and the noise levels for both receivers, FDX and HDX. These data are intended to be sent to technical staff for further evaluation.

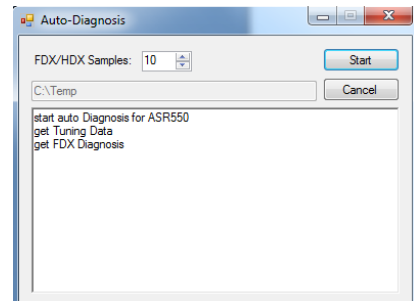
When you click on “Auto Diagnosis” the following window will appear. Per default, the Demo Software will request 10 of each samples – FDX and HDX and the HDX frequency. Since noise is not static, it always makes sense to save more than 1 sample per channel. You can press start in order to continue or 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. 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 your local distributor. You may also pack the files using WinZip, WinRar or a similar program.

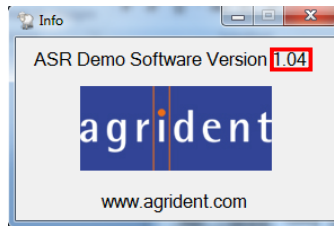


4.3.3.3 Diagnosis

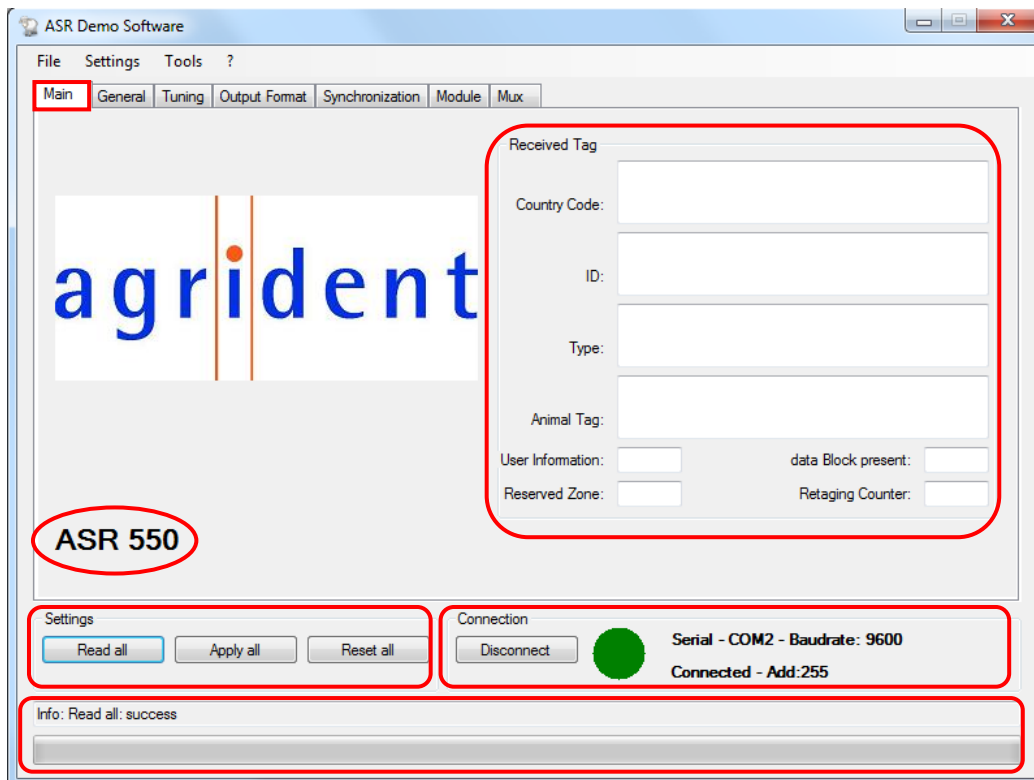
The “Diagnosis” menu item is the manual way of the above described Auto Diagnosis. It is intended to be used by more ‘advanced’ users only since it requires a little bit of background knowledge. It can be used for watching, recording and replaying the signals from the ASR550 receivers. It can be a very powerful tool for troubleshooting on site. Nevertheless it is a quite complex issue and thus it will not be described here any further, but in a separate manual.

4.3.4 Help

The “?” menu contains the menu item “Info” only. Here you can see the current version of the PC-Demo software.



4.4 The Main-Window of the PC-Demo Software



After the Demo Software was started and the connection to the ASR550 was successful, you should see a screen similar to the one above. The main screen consists of the sections “Received Tag”, “Settings”, “Connection” and an area for status messages (Info) which also contains a progress bar. Beside that you can see which type of reader is connected to the PC Demo Software – here an ASR550.

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.

Country Code: **999**

ID: **256646466671**

Type: **FDX-B**

Animal Tag: **TRUE**

User Information: 2 data Block present: FALSE

Reserved Zone: 0 Retagging Counter: 1

4-digit Country Code as defined per ISO 11784/11785

12-digit National Identification Code as defined per ISO 11784/11785

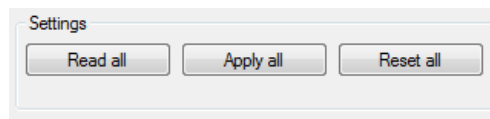
Transponder Type, if supported by the selected output format (FDX-B or HDX)

Indication of whether the read transponder is an animal tag or not, if supported by the selected output format (can be TRUE or FALSE)

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”.

4.4.2 Settings

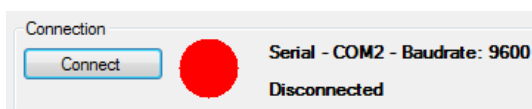
These buttons are available within all tabs of the main window. “Read all” requests all reader settings in one step, independently of the tab which is currently active. “Apply all” is similar but will send all settings to the ASR550. “Reset all” will set the reader back to factory default values.



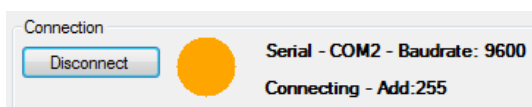
Please note that there is no additional “Save” command necessary for storing the configuration in the reader’s non-volatile memory like it had to be done for the previous Agrident Stationary Readers.

4.4.3 Connection

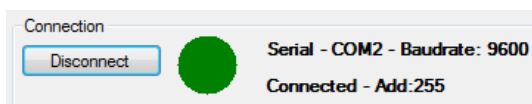
As already mentioned earlier in this manual, the “Connection” area indicates the serial connection status of the reader. There are three possible conditions:



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”.



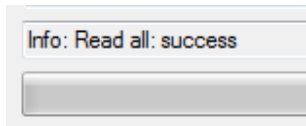
The PC-Demo Software opened the port and tries to connect to the reader. If this did not succeed after some seconds, please check your port settings again.



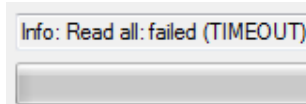
The program could connect to an Agrident reader successfully. The complete reader settings (from all tabs) are requested and filled in into the corresponding fields automatically.

4.4.4 The “Info” area

This section is used for displaying status messages. In addition there is a status bar indicating progress of the current operation.



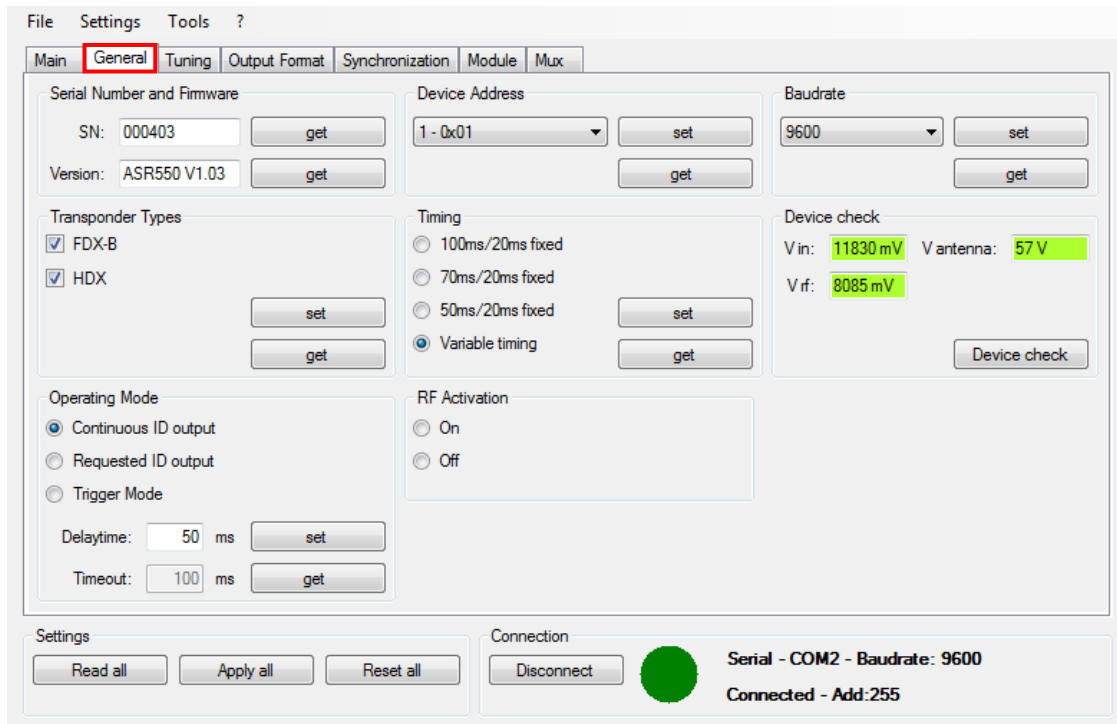
In this example the request for all reader settings (“Read all”) was answered by the reader successfully.



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 other “Set” or “Get” operations.

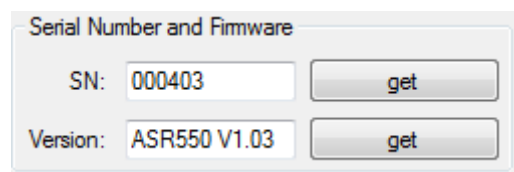
4.5 General Settings




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

4.5.1 Serial Number and Firmware Version

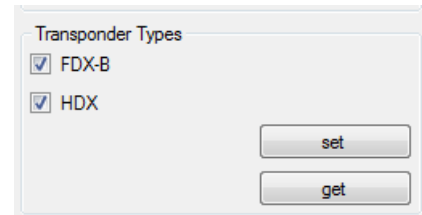
You can request the 6-digit Serial Number of the reader, which corresponds with the ID Label on the printed circuit board. You may also request the currently used Firmware version.



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

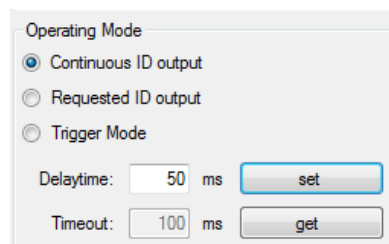
4.5.2 Transponder Types

Since the ASR550 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.



4.5.3 Operating Modes

The ASR550 has three different operating modes. They allow to adapt the behaviour of the reader for 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 ASR550 will send the EID to the interface. The interface can be RS232, RS485 or Bluetooth or Wi-Fi 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".

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 Wi-Fi 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 operation 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 ASR550 detects a transponder, the ID will be written into an internal buffer. The buffer can contain five 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 ASR550 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 4.5.4 (Device Addresses) for details.

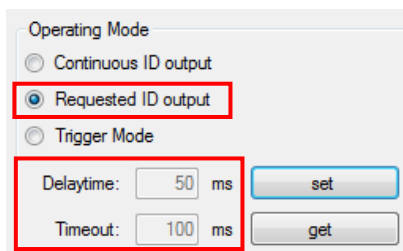
The Last_ID requests to the different readers have to contain the corresponding reader address as destination address. If you have to implement this into your own software, the ASR550 protocol description provides further helpful information.

If the reader is operating in this mode, you will see an additional button “Get LAST ID” in the “Received Transponder” section of the “Main” tab.



In the above example, there was no ID in the buffer.

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 earlier ASR models.

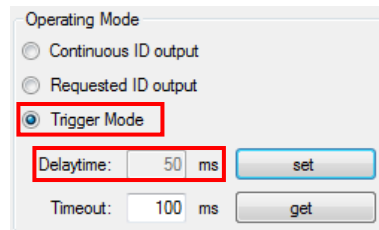
3. Trigger Mode

Using the Trigger Mode will force the ASR550 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 ASR550 tries to read a transponder before deactivating the field again. The value is configurable in milliseconds.

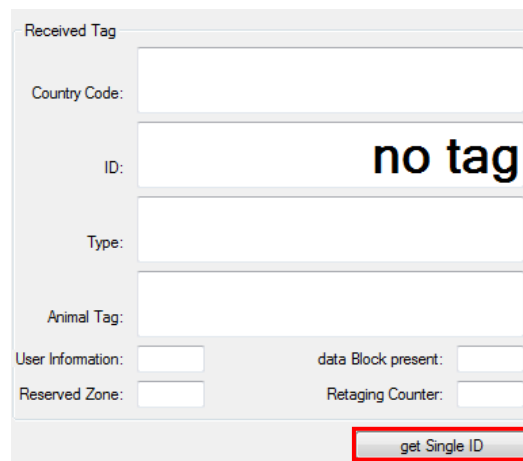
Value Hex	Value Decimal	Remarks
01	100ms	Default
02	200ms	
...	...	100 ms steps
FF	12750ms	Maximum value

If a transponder was read before the Timeout has elapsed, the ASR550 will immediately switch off its RF-field and return the tag number.



The Delaytime is greyed out because it has no 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”.

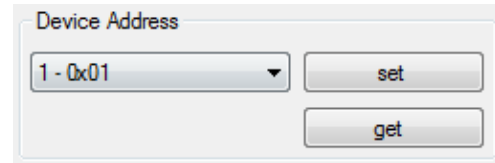


Pushing this button, the PC Software will send a “Single_ID” request to the reader. The ASR550 will activate its RF-field until it read a transponder or the configured Timeout has elapsed. In case of having read a tag, the reader will return the ID. If the Timeout is over before a transponder could be read, the ASR will return an “Empty ID” message.

The Trigger Mode was called “Slave Request” mode for previous reader models.

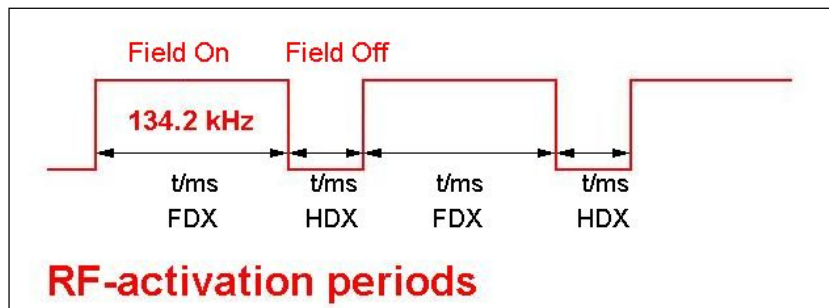
4.5.4 Device Address

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 ASR550 protocol description.



4.5.5 Timing

In order to allow the ASR550 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:

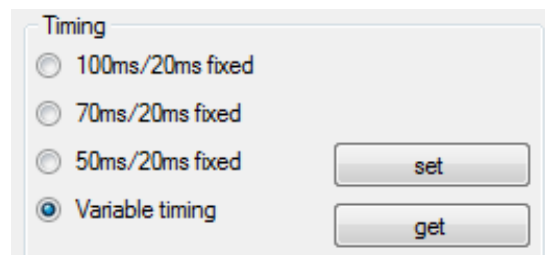
FDX tag present?	HDX tag present?	Field-On time	Field-Off time
No	No	50ms	4ms
Yes	No	50...100ms	4ms
No	Yes	50ms	20ms
Yes	Yes	50...100ms	20ms

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 ASR550 offers 3 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 and 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 ASR550 will always use the variable timing again.

The “get” button requests the currently configured setting from the reader.

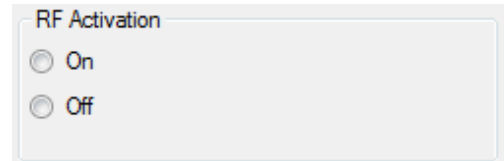


4.5.6 RF-Activation

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 guaranteed write-cycles (EEPROM).

So if your application requires enabling and disabling the RF-field many times a day, let's say several hundred times, you should use this command. It will not be written into the EEPROM, just into the RAM; so this setting is only active as long as the ASR550 is not re-started.

Please select the intended radio button in order to switch on or off the RF-field. After restarting the ASR550, the RF-field will always be activated, unless the reader is configured to Trigger Mode.



RF Activation

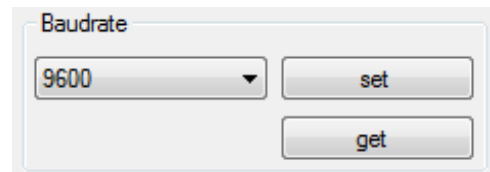
On

Off

4.5.7 Baud Rate

The ASR550 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, Wi-Fi or Ethernet.

Choose the intended baud rate and confirm with "set". The actual setting can be requested via "get".



Baudrate

9600 ▼

set

get



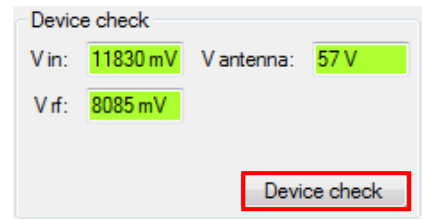
It is absolutely important that the baud rate of any PC-Software or customized controller is the same as the configured baud rate for the ASR550. If this is not the case, communication will not work at all.

4.5.8 Device Check

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

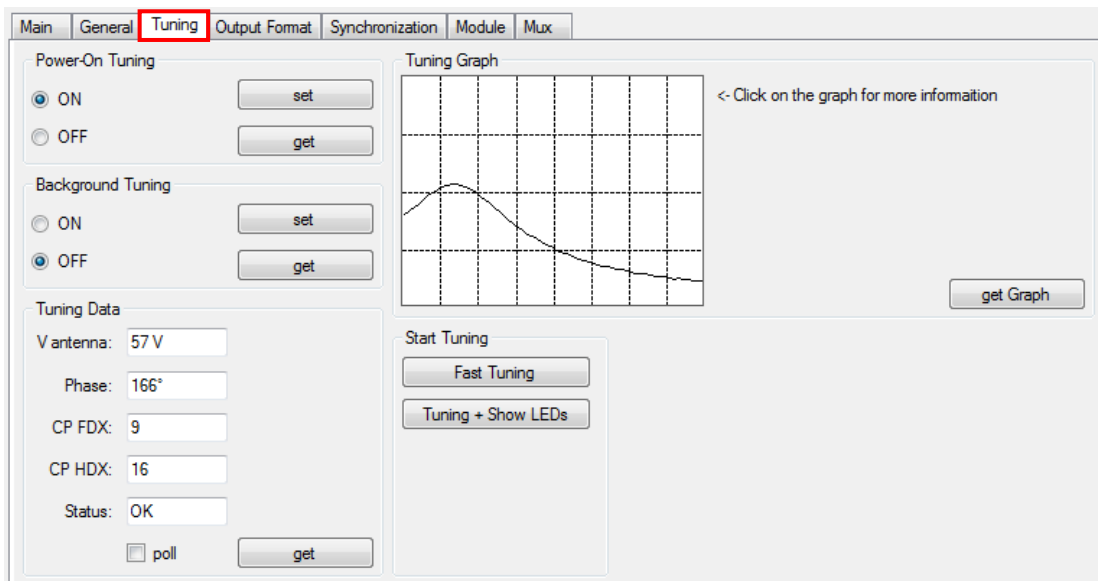
1. V in: Shows the DC supply voltage for the reader. The ASR will disable the transmitter, if the voltage is 10.8 volts or lower (measured on the reader board, not at the power supply).
2. V rf: The transmitter voltage, should be about 8000mV.
3. V antenna: The antenna voltage depends on the antenna impedance (which can also be affected by the presence of metal). If the impedance of the antenna is within an acceptable range, the antenna voltage should be between 50V and 65V.

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.



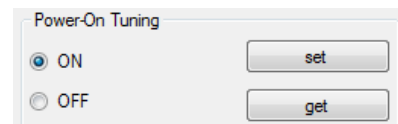
4.6 Tuning

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



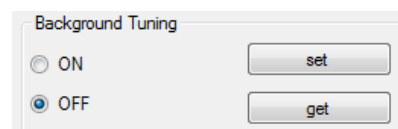
4.6.1 Power-On Tuning

The setting “Power-On Tuning” decides if the ASR550 will perform a complete Autotuning procedure after switching on or not. This tuning takes less than 200 ms and is enabled per factory default.



4.6.2 Background Tuning

The ASR550 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



4.6.3 Tuning Data

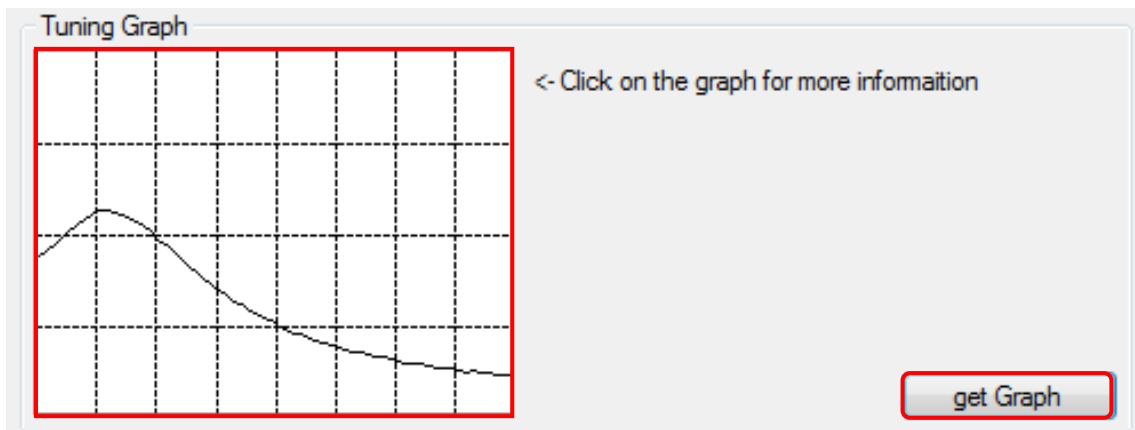
As already mentioned in this manual earlier, the correct tuning of the antenna significantly decides about the reading performance. The section “Tuning Data” gives an overview about important values concerning the antenna status.

The antenna voltage “V antenna” should be within a range of 50 to 65 volts. The Phase is only used for internal purposes, so please don’t care about this value. “CP FDX” indicates the currently used capacitor pattern, or tuning value, for the FDX period. 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 value of “CP HDX” is always 7 steps higher than the CP FDX value. The “Status” field gives further information in case of an antenna fault. In this example it says “OK” because there is no antenna fault. You might request those values once by pressing the “get” button, or repeatedly by activating the “poll” checkbox.

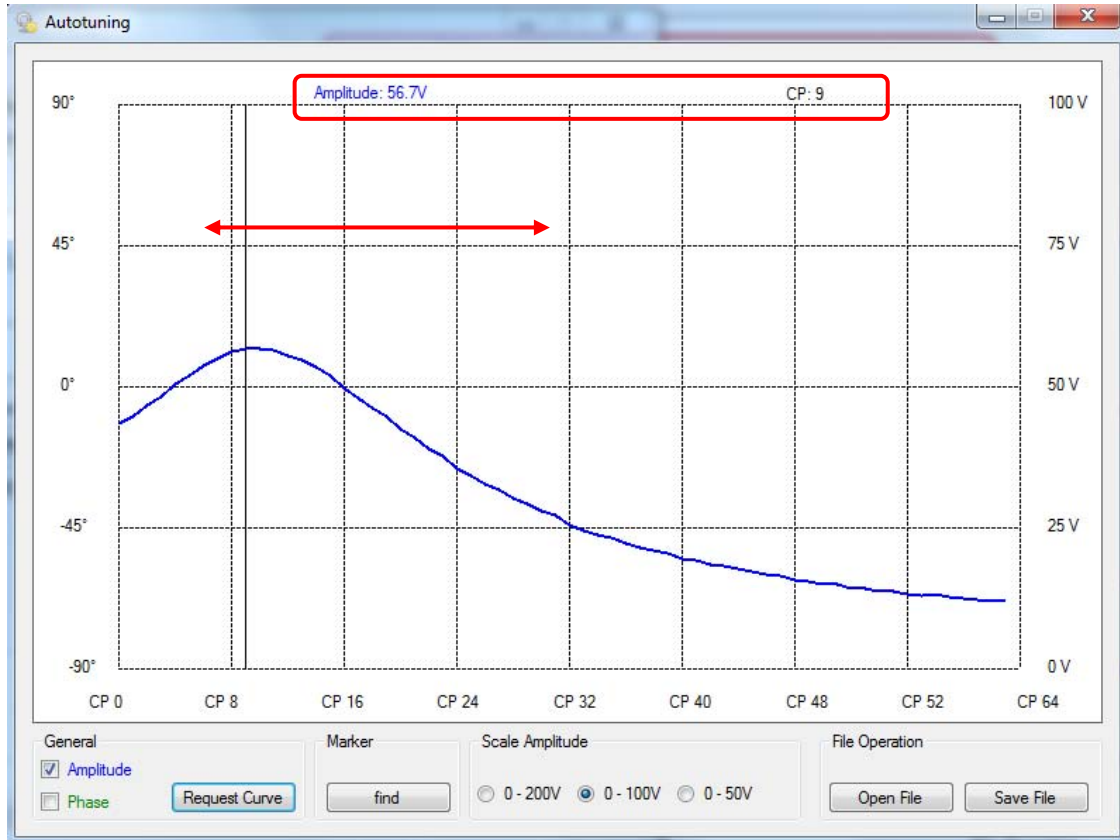
Tuning Data	
V antenna:	57 V
Phase:	166°
CP FDX:	9
CP HDX:	16
Status:	OK
<input type="checkbox"/> poll	get

4.6.4 Tuning Graph

The “Tuning Graph” section allows to request a complete tuning curve from the reader in one step. 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 Capacitor pattern, the voltage value will change accordingly.

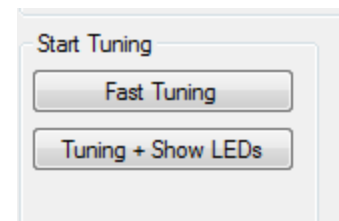
Pressing the “Request Curve” button will force the PC-Demo software to request the tuning curve again. The “find” button in the “Marker” box will set a permanent marker on the Capacitor Pattern which is currently used by the reader.

You might change the scaling of the amplitude as well. For the ASR550 the default setting of “0-100” 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 you Autodiagnosis data you want to evaluate.

4.6.5 Start Tuning

The Demo Software offers two different ways of Autotuning the reader manually by sending the corresponding command, “Fast Tuning” and “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.

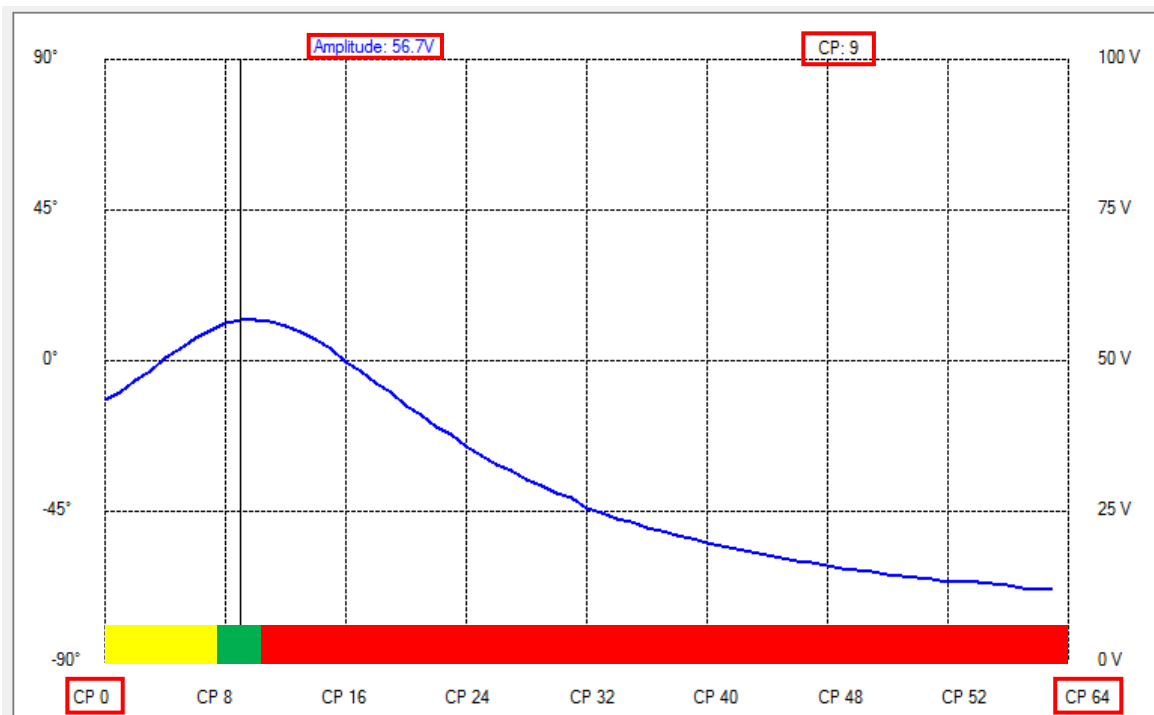
“Tuning + Show LEDs” will first do the same like “Fast Tuning” but after the tuning procedure is finished, the ASR will show an LED sequence fairly slow in order to indicate the approximate position of the voltage maximum. The reader will perform this kind of tuning if the button on the external LED board is pressed.

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:

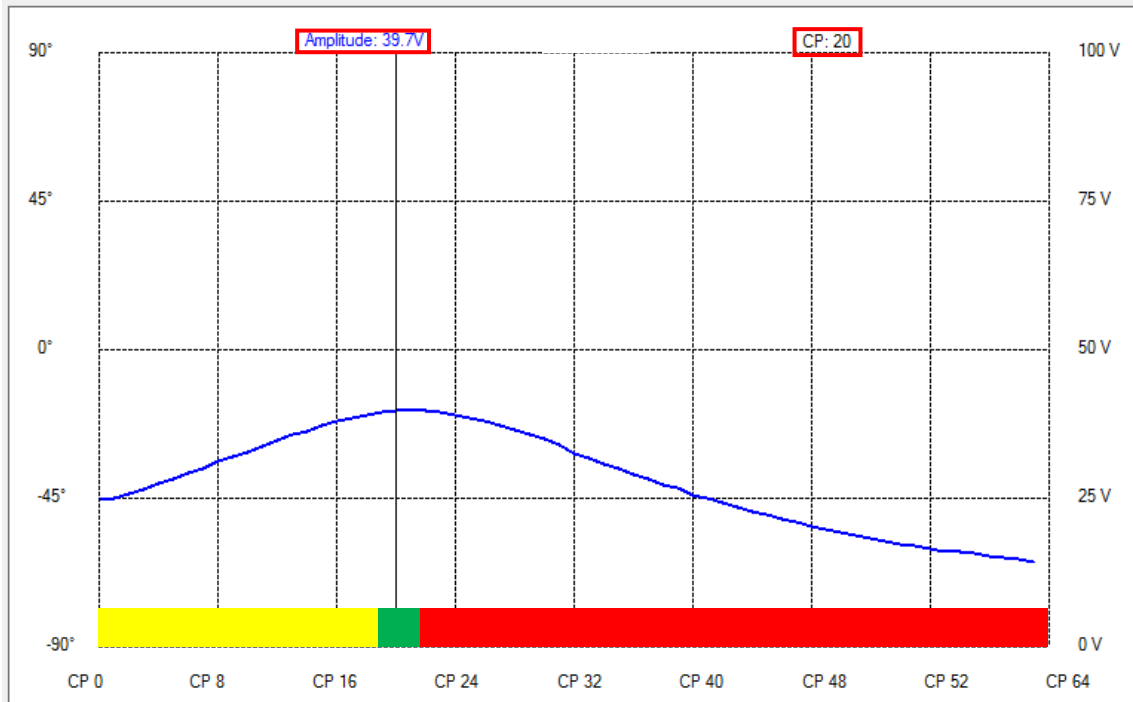


The above shown curve has shown a maximum voltage at Capacitor pattern 9. The colored bars should simulate the approximate activation times of the LEDs for this example curve. The lowest possible value is CP = 0 on the left side which means that no Autotuning capacitor is set. The highest possible value is CP = 64 on the right side – in this case the ASR has set all tuning capacitors.


Since a value of 9 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.

This example shows a tuning curve like it should be. The CP which is used is within the ideal range of 9 to 11 and the voltage is ok as well. So we can assume that there is no or not too much metal close to the antenna.

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

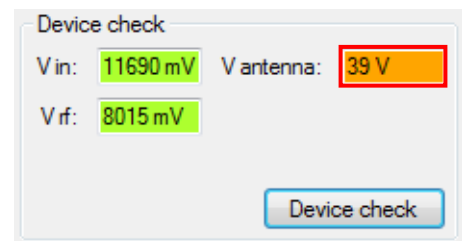


Due to the presence of metal the ASR550 has decided for a Capacitor Pattern of 20. In this case, the yellow LED will be activated longer. What you can also see is that the amplitude has decreased from 56.7V to 39.7V which leads to the following, very important, conclusion:



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.

The “Device check” in the “General” tab would indicate the lower voltage as well by coloring the V antenna field orange.



The antenna status in this example does not mean that the ASR is not able to read transponders anymore – but the reading range will be reduced unnecessarily.

4.7 Output Format

4.7.1 Introduction

The ASR550 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

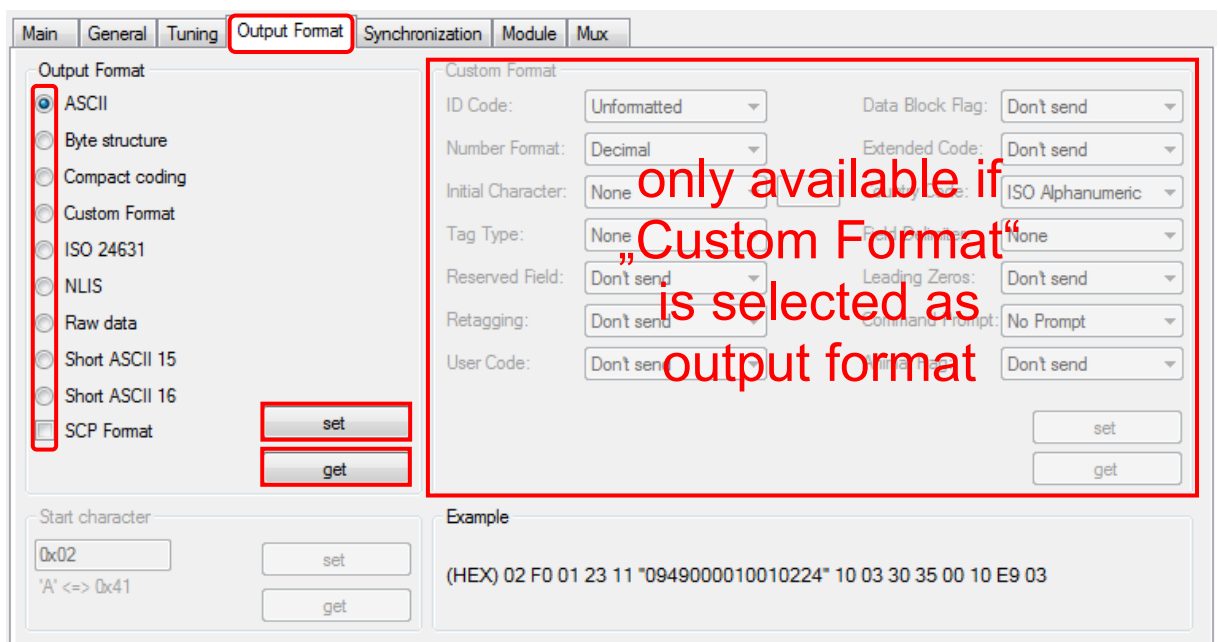
If “SCP Format” is checked in ASCII mode additionally, the control signs are left out and the information are transmitted without the frame.

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

4.7.2 Changing the output format



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

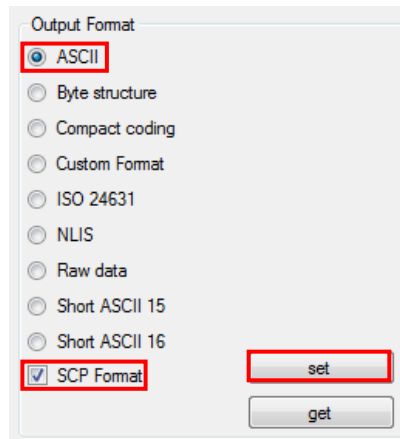
4.7.3 Output Formats description

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 described in the ASR550 protocol description detailed.

4.7.3.1 ASCII

The "ASCII" format is using the transmission frame. In this format the country code and the 12 digit national identification code are transmitted in ASCII notation. For information about how to evaluate an ASCII telegram, please see the separate "ASR550_Protocol_Description" document.

The option "**SCP-Format**" offers the possibility, to send the ASCII number without transmission frame. Only the last 10 digits of the national identification code are transmitted. For other formats than ASCII, the SCP Format is not available and thus greyed out.



Example ID Format ASCII and SCP format

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).

4.7.3.2 Byte structure

The format "Byte Structure" is also using the transmission frame. In Byte structure the complete 64 Bit data content of the transponder are transmitted. For information about how to evaluate a Byte Structure telegram, see the "ASR550_Protocol_Description" document.

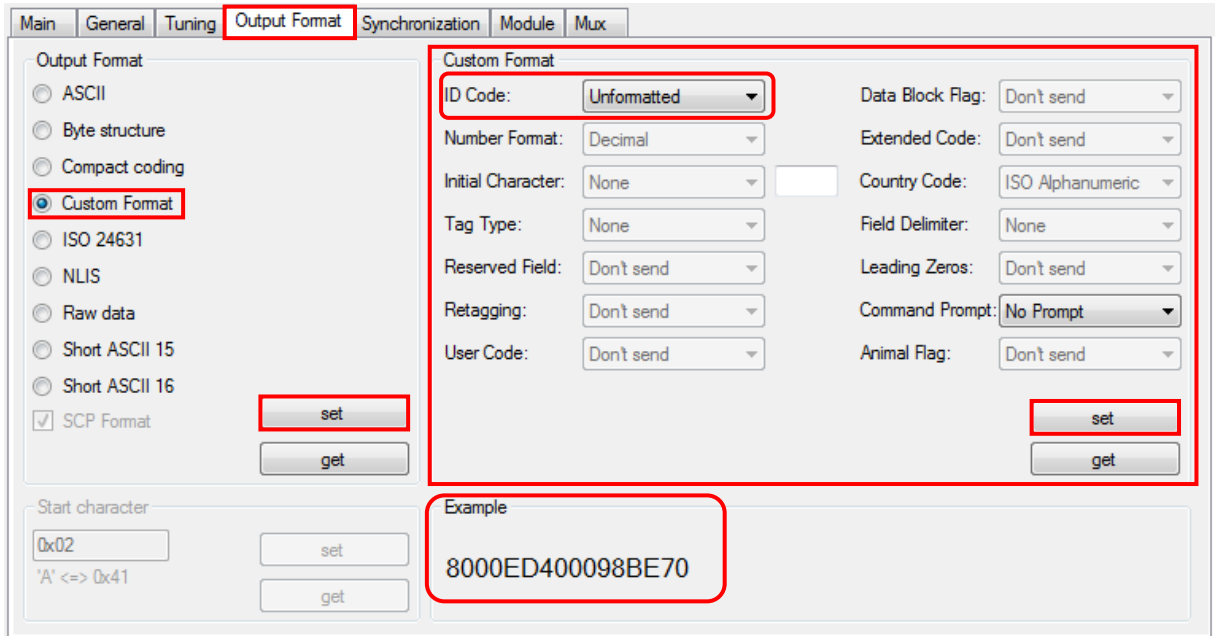
4.7.3.3 Compact coding

The format "Compact coding" is also using the transmission frame. The country code and the national identification code are transmitted in BCD notation. For information about how to evaluate a Compact coding telegram, see the "ASR550_Protocol_Description".

4.7.3.4 Custom format

The custom format is like a construction kit, the user 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 you 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.

If the “ID Code” is set to “Formatted”, it is possible to select or deselect initial characters and additional information, to choose delimiters or to cut leading zeros. Select your desired custom format and press the corresponding “set” button.

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 representation
HEXADECIMAL	hexadecimal (0-9 and A-F) number representation

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 ID code string 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:	
<i>You want the ASCII character "A" as initial character.</i>	
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	
<i>ALLFLEX STYLE</i>	
FDX-B-ISO transponders	F
HDX-ISO transponders	H
HDX-Industrial R/O transponders	R
HDX-Industrial R/W transponders	W
<i>TIRIS STYLE</i>	
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

Extended Code	
<p>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.</p>	
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	
<p>The field delimiter separates identification code items. Between the initial character and the ID-tag type identification character no delimiter is sent!</p>	
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

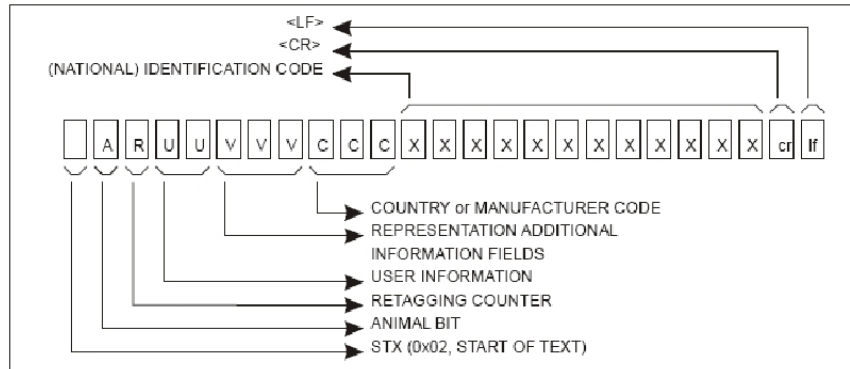
Leading Zeroes		
		Example
Don't Send	does not send leading zeroes	980 123456
Send	does send leading zeroes	980 000000123456

Command Prompt	
<p>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.</p>	
No prompt	disables transmission of the command prompt
Send prompt	enables transmission of the command prompt

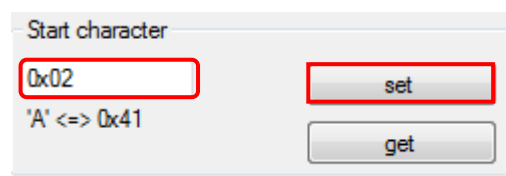
Animal Flag	
Don't send	does not send the animal flag
Send	does send the animal flag

4.7.3.5 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”.

4.7.3.6 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

4.7.3.7 Raw data

The format “Raw data” uses the transmission frame. In this format, the complete content of the transponder (for FDX-B including header and control bits) is transmitted. In case of HDX transponders, Byte structure and Raw data output format is similar because HDX tags do not contain additional bits. For information about how to evaluate a Raw data telegram, please see the “ASR550_Protocol_Description” document.

4.7.3.8 Short ASCII 15

If Short ASCII is activated, 15 digits (3 digits country code + 12 digits ID) will be transmitted in ASCII notation without frame. The leading zero 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 '0984010900316358'
 CR 0x0D
 LF 0x0A

4.7.3.9 Short ASCII 16

Short ASCII16 is the same as Short ASCII15 but the leading zero in the country code is transmitted. The last characters of the telegram are <CR> (0x0D) <LF> (0x0A).

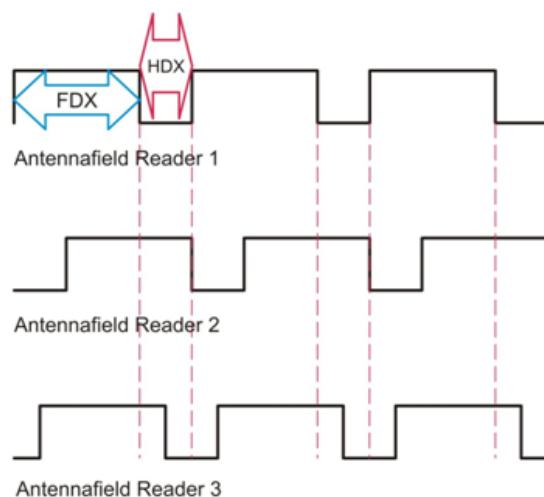
ID0	ID1	ID2	ID3	ID4	ID5	ID6	ID7	ID8	ID9
'0'	'9'	'8'	'4'	'0'	'1'	'0'	'9'	'0'	'0'
ID10	ID11	ID12	ID13	ID14	ID15	CR	LF		
'3'	'1'	'6'	'3'	'5'	'8'	0x0D	0x0A		

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

4.8 Synchronization

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

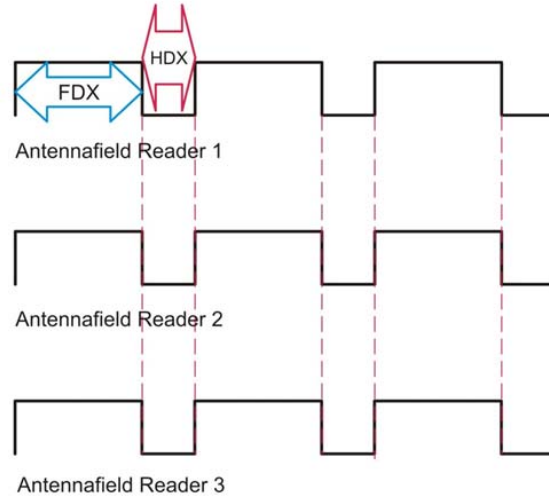
The example on the right shows that the readers are not synchronized. If reader 1 tries to read an HDX tag when the field is switched off, it might fail in this scenario. The reason is that readers 2 and 3 have their fields activated at this time; that means, they transmit on the same frequency like the HDX transponder – but with much more power. If the unsynchronized readers are too close to each other (up to 50 meter, 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.



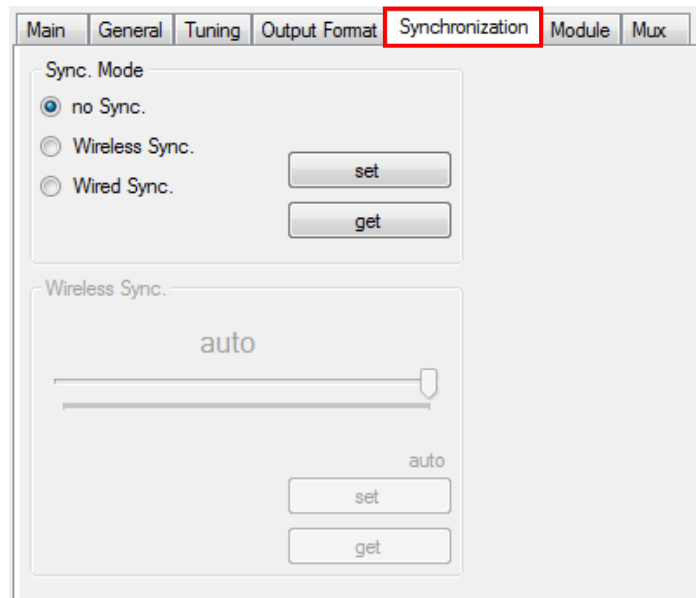
The solution for this problem is "Synchronization". There are particular mechanisms which ensure that the timing of several readers is strictly synchronized.

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 and the transponder signal can be picked up.



Please open the “Synchronization” tab in order to set up the ASR550 for synchronization.



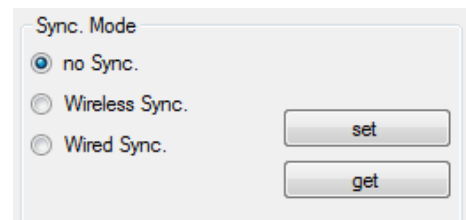
Per default, synchronization is disabled. If “Wireless Sync.” is not activated in the “Sync. Mode” section, the advanced Wireless Sync. settings are greyed out and thus not available.

Independently of the method of synchronization, wired or wireless, there is no particular Sync. Master – the readers decide independently which ASR550 is the Master. If the Master reader stops working, another reader will automatically take over the role of the Sync. Master.

4.8.1 Sync. Mode

There are three different settings possible:

1. no Sync.
2. Wireless Sync.
3. Wired Sync.



1. No Sync. Mode

Using this setting, which is also the factory default value, the ASR550 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 Agrident 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 ASR550 to a fixed timing of **50:20ms** – if there are no other reasons which would speak against that.

2. Wireless Sync. Mode

The ASR550 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. More details about this option will be explained in chapter 4.8.2 – "Wireless Sync. Level".

3. Wired Sync. Mode

The ASR550 is also capable of doing Wired Synchronization. The disadvantage compared to the Wireless Sync. is that you have to run cables between all readers you want to sync. 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, which works completely independently of any noise levels, it is recommended to use Wired Sync.

The Wired Sync. is not available on the ASR550 board per default. You require an add-on module for this purpose.

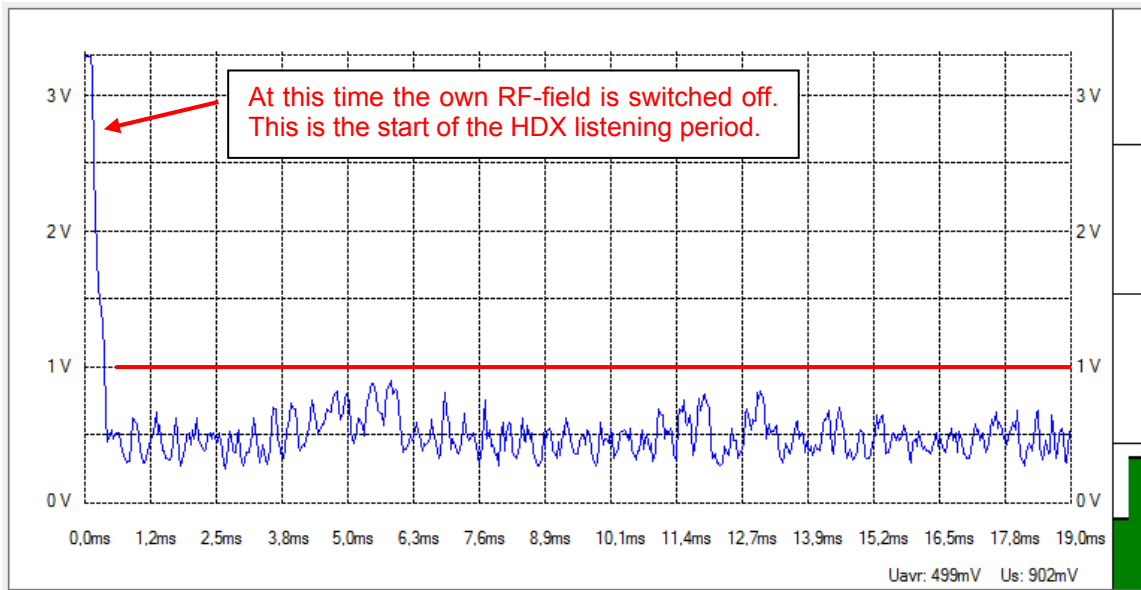
For details about the Wired Sync. Module (ASY100), please see the corresponding application note.

4.8.2 Wireless Sync. Level

How does wireless Sync. work?

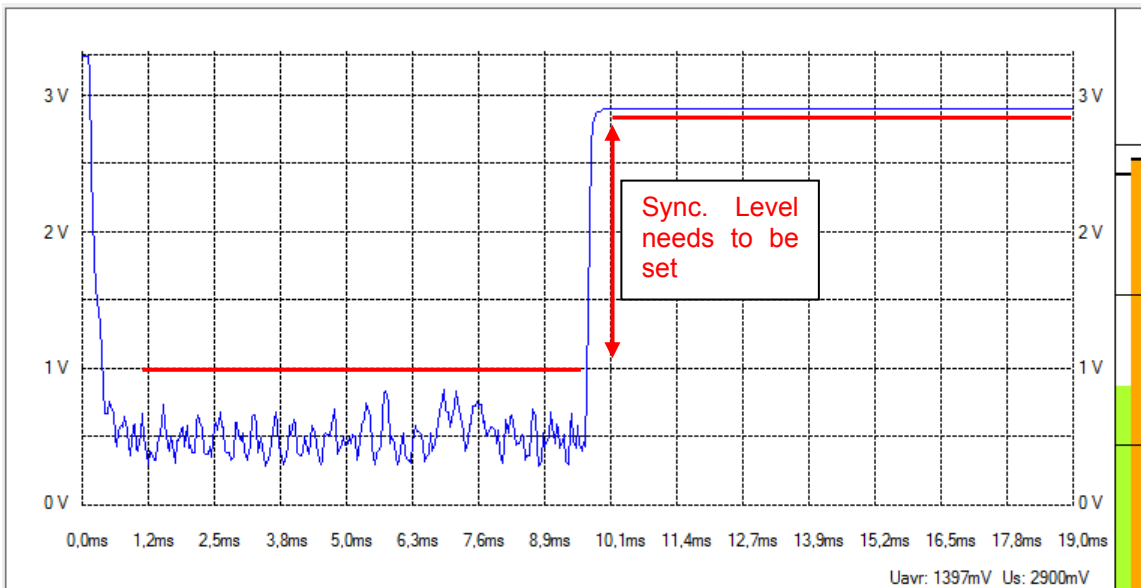
During the HDX listening period, the ASR550 is able to evaluate the so called RSSI level. RSSI means: Received Signal Strength Indication. You might already know this term from other radio technologies like Wi-Fi. If another reader is activating its RF-field during the HDX listening period of the reader we are currently looking at, the ASR550 will take this 'rising edge' in the RSSI as the reason, also to activate its own RF-field immediately.

Although the integrated diagnosis function of the ASR550 was not explained in detail in this manual, we will have a look at some RSSI samples. If necessary, please refer to the "ASR550_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 which just activated its field.

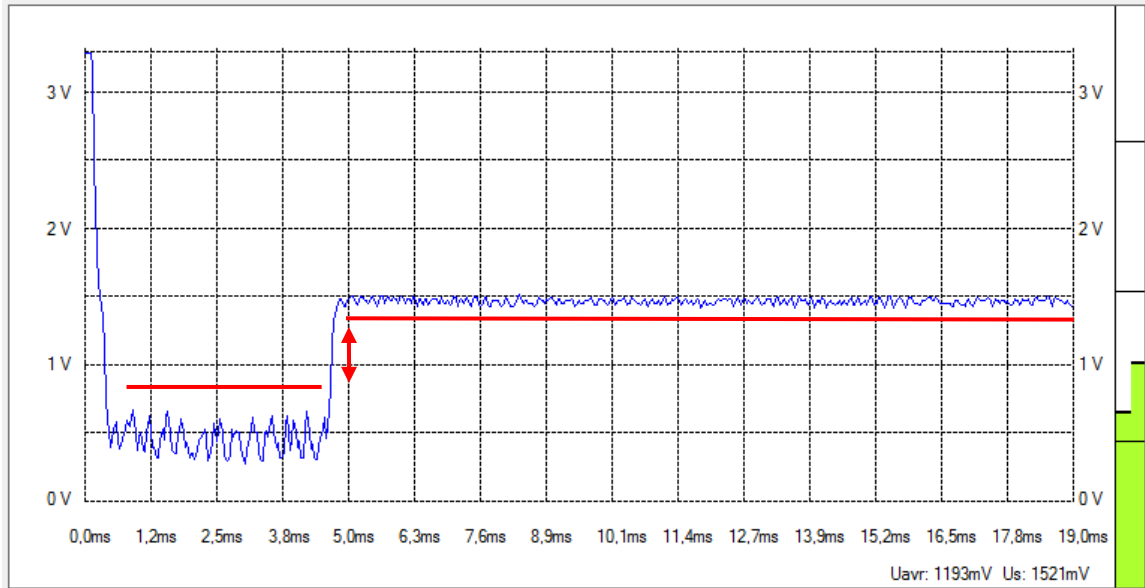


What the ASR550 requires in order to make the correct decision is a particular Sync. Level. The level needs to be set higher than the highest peak in the ‘background noise’. So in our example it would be okay to set the Sync. Level to approximately 1V. You might also set it higher but then you decrease 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 ASR550 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.

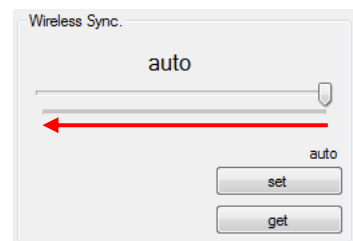
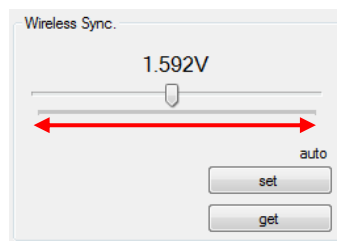
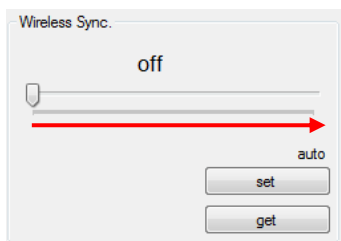


If you would select a Sync. Level of 1.5 Volts or even higher in this case, Wireless Sync. would never work because the signal, caused by the other reader, never reaches 1.5 Volts.

Fortunately the ASR550 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, we highly recommend using 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 current setting 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 ASR550 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 ASR550 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:

Timing

100ms/20ms fixed

70ms/20ms fixed

50ms/20ms fixed

Variable timing

set

get

The ASR550 will use a fixed timing of 50ms field activation and 20ms field off.

Timing

100ms/20ms fixed

70ms/20ms fixed

50ms/20ms fixed

Variable timing

set

get

The ASR550 will use a fixed timing of 50ms field activation and 20ms field off.

Timing

100ms/20ms fixed

70ms/20ms fixed

50ms/20ms fixed

Variable timing

set

get

The ASR550 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).

Timing

100ms/20ms fixed

70ms/20ms fixed

50ms/20ms fixed

Variable timing

set

get

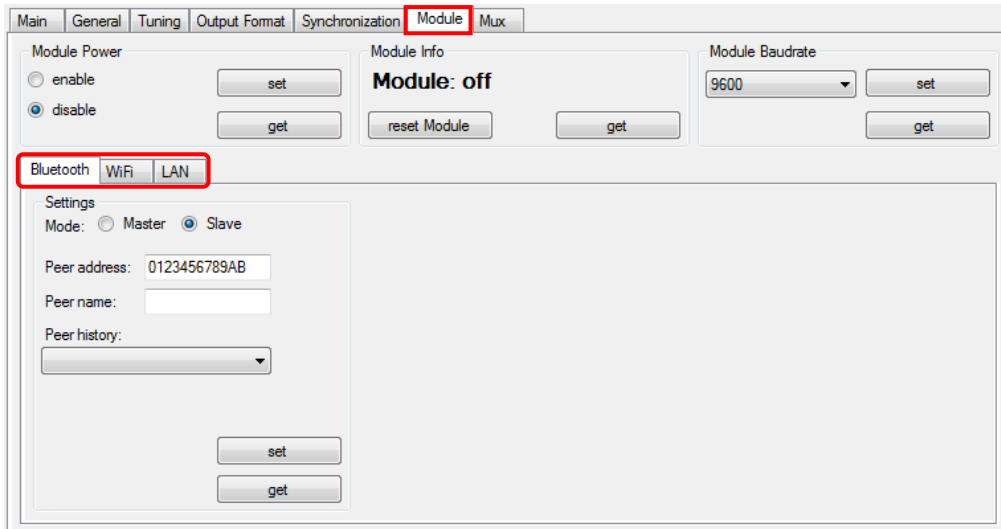
The ASR550 will use a fixed timing of 100ms field activation and 20ms field off. The exception is every 10th cycle, which is 50:20ms. This allows wireless synchronizing Handheld readers to detect an HDX tag every 1150 milliseconds (9x120ms + 70ms).

4.9 Module

The ASR550 offers a wide range of optional add-on modules such as:

- Bluetooth (Class 1, up to 100 meter range, Master capable)
- Wi-Fi (up to 100 meter range)
- Ethernet
- Antenna Multiplexer (4-channel or 8-channel)

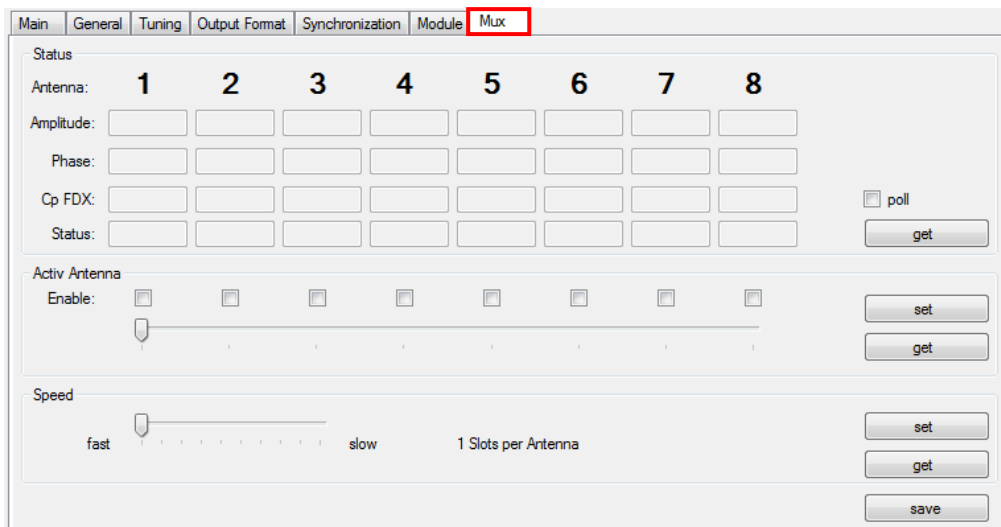
The Bluetooth, Wi-Fi or Ethernet modules can be configured in the tab “Module”.



Since those additional modules for communication are not part of the ASR550 board but optional hardware, the configuration of the modules is explained in the corresponding manuals.

4.10 Mux

The Antenna Multiplexers for the ASR550 allow using the reader with up to eight antennas with a single reader. The different antennas are used successively in this scenario – not all at the same time. The Multiplexer settings can be found in the tab “Mux”.



Since the Multiplexer boards are optional accessories for the ASR550, the technical details will not be described here. Please contact Agrident for further information.

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 ASR550 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 ASR550 Reader will render the warranty null and void.

6 Warranty

The manufacturer of the ASR550 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 Agrident 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 a 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, Agrident BV declares that this equipment, if used according to the instructions, is in compliance with the essential requirements and other relevant provisions of the RTTE Directive 1999/5/EC. For use in all countries of the EU.

To obtain a copy, contact Agrident BV and request the “Declaration of Conformity” document for Multi-technology readers.

Agrident BV
mail@agrident.com

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.



8 FCC and IC digital device limitations

FCC § 15.19

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 § 15.21 (Warning Statement)

[Any] changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Canada CNR-Gen Section 7.1.3

This device complies with Industry Canada licence-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:

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