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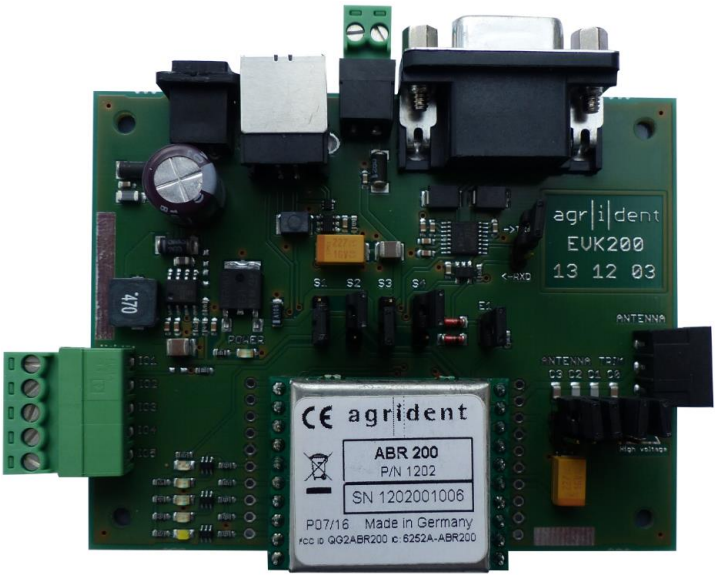
EVK200
Evaluation Board for ABR200



A B R 2 0 0 F i r m w a r e v 1 . 0 0 a n d h i g h e r
A S R - P C - D e m o S o f t w a r e v 1 . 3 9 a n d h i g h e r

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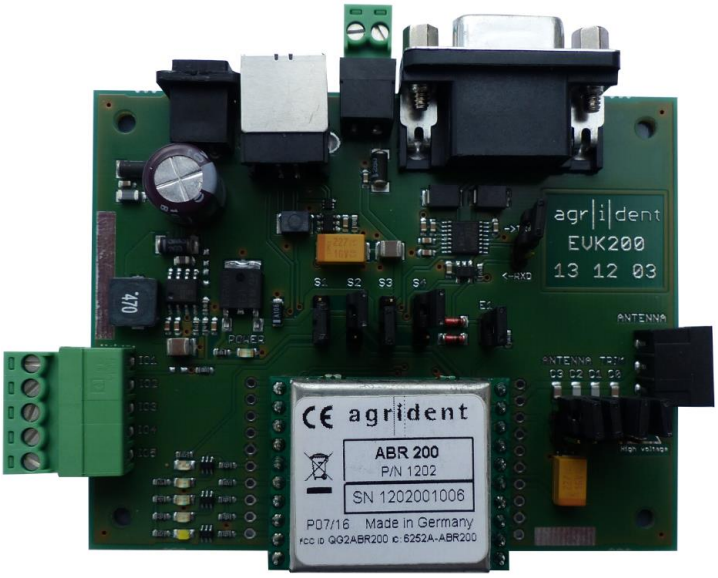
Content

1 Introduction

In order to make the ABR200 implementation easier for new customers, Agrident provides an Evaluation Kit for this module. This Kit contains:

- EVK200 – Evaluation Board for ABR200 OEM reader module
- ABR200 – OEM reader module with female connector strips
- 100mm Ferrite Antenna
- 12 Volt wall wart with several AC adapters for use in most countries of the world
- RS232 cable
- USB cable

The following picture shows the EVK200 Evaluation Board with an ABR200 connected:



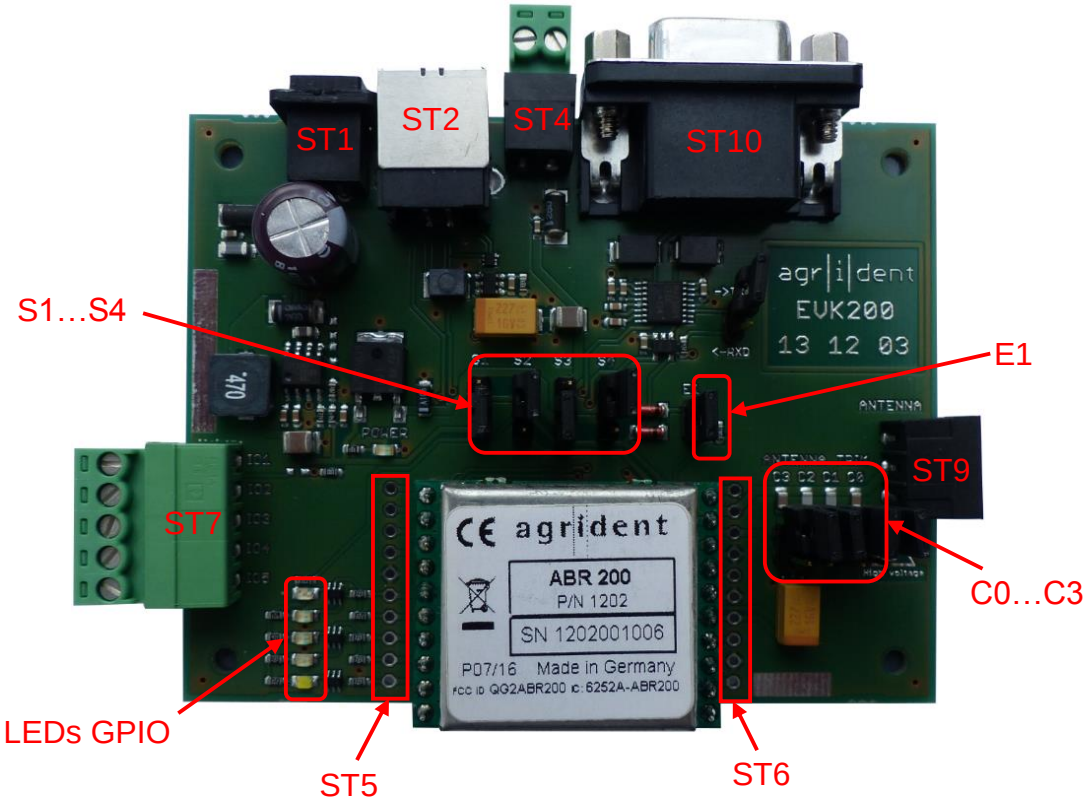
In order to make the software development easier, Agrident also provides PC-Demo-Software, which was originally developed for Agrident Stationary Readers (ASRs), but also works with the ABR200. Features which are only supported by ASRs, but not by the ABR200, are greyed out and thus not available.

The PC-Demo-Software and the according reader settings, will be explained later in this document.

For technical details about the ABR200 itself, please refer to the ABR200 integration manual.

2 The different connectors and jumpers

The EVK200 has a lot of different connectors for supplying the board with power, for connecting the antenna, interfaces and GPIOs, if required. In addition, there are several jumpers for selecting the input voltage source, for enabling the ABR200s power supply and for adding additional tuning capacitors.



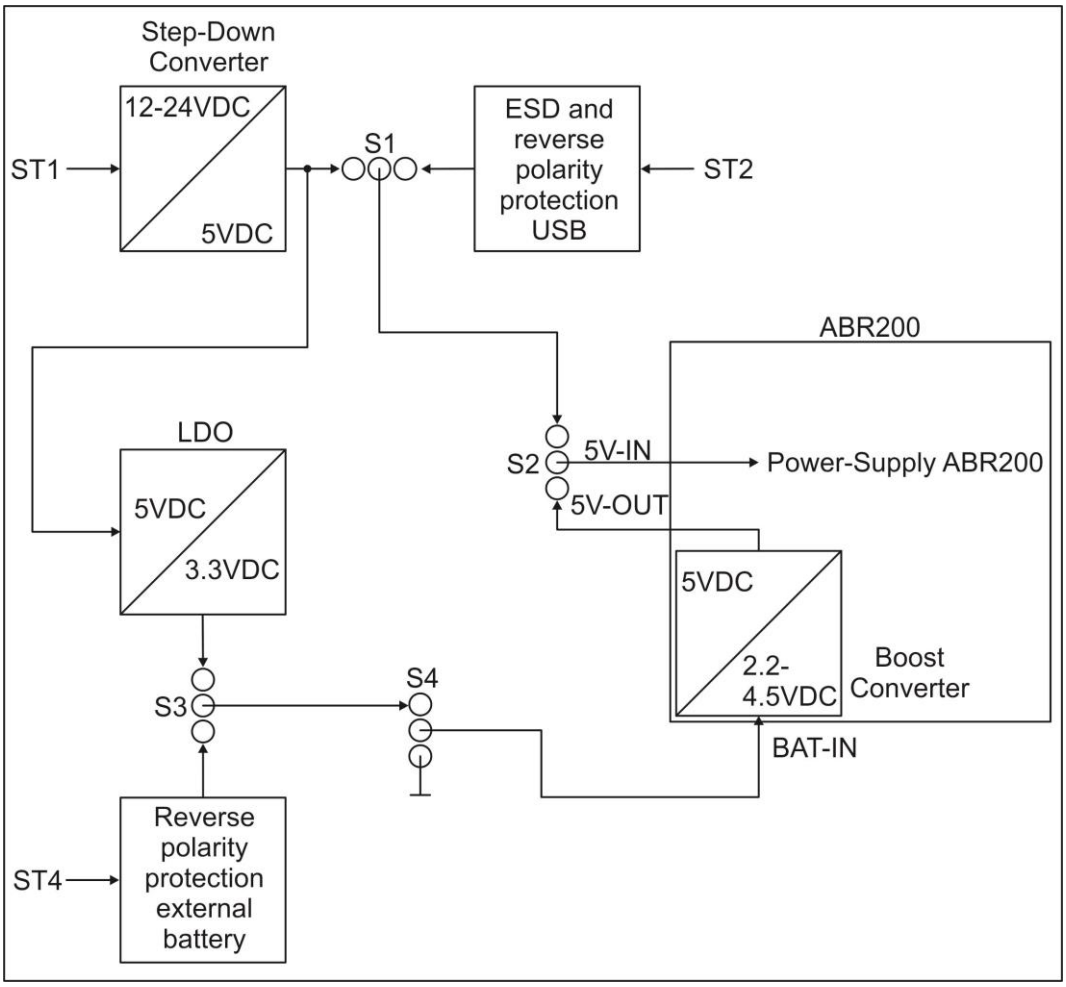
Item	Description
ST1	DC-Power-Supply, 8V … 24V (provided wall wart has 12V)
ST2	USB-Connector (standard B-type)
ST4	Battery connector (directly supply ABR200 with 2.2…4.5V DC)
ST5	same pinout as ABR200 connector on the left side
ST6	same pinout as ABR200 connector on the right side
ST7	Connector for GPIOs
ST9	Antenna connector
ST10	RS232 connector, D-SUB 9-pin, female
LEDs GPIO	Five LEDs which indicate the current GPIO status
S1…S4	Jumpers for selecting the input voltage source for the module
E1	Jumper for enabling the module power
C0…C3	Jumpers for adding additional capacitance to the antenna resonant circuit

2.1 Jumpers for power supply selection

The EVK200 has 4 jumpers (S1 to S4) for selecting different power sources. The table below shows the jumper positions for a particular power supply option.

Jumper	S1	S2	S3	S4
V_{in} = 5V	down	up	wherever	up
Powered via USB	up	up	wherever	up
V_{in} = 3,3V (Boost Converter)	wherever	down	down	down
V-BAT (BOOST Converter)	wherever	down	up	down

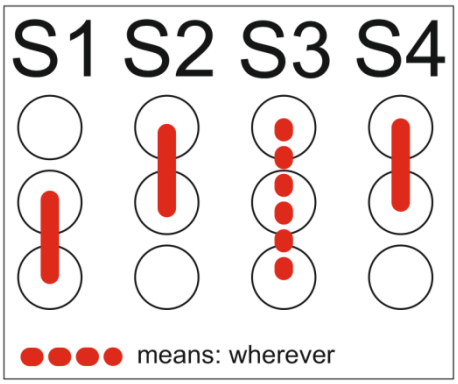
The following block diagram shows the power supply options on the EVK200 and the functions of the jumpers S1 to S4.



For supplying the reader module with 5 volts, you may either use the on-board step-down converter or 5 volts from USB. If the ABR200s boost converter should be used instead, you can use the 3.3 Volt linear regulator on the EVK200 or an external battery via ST4.

2.1.1 Using 5V from the step-down converter

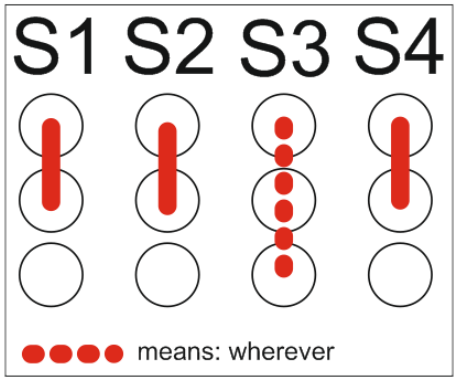
As shown in the previous diagram, the EVK200 contains a step-down regulator which converts the input voltage (8...24VDC) down to 5VDC. These 5 volts can be used for the ABR200 power supply directly. In this case the ABR200s boost converter is not used.



S1 has to be set down, S2 and S4 up and the position of S3 does not matter.

2.1.2 Using USB for power supply

If the ABR200 should be supplied with power from USB (V-BUS), the connection of S1 to S4 has to be done as shown below.



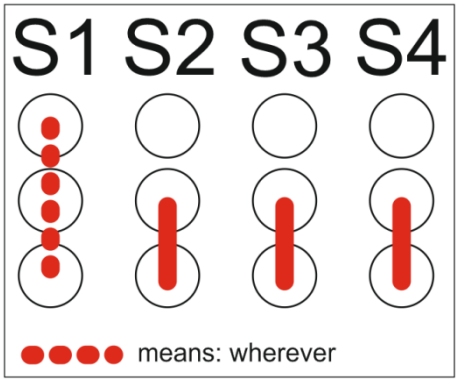
S1, S2 and S4 have to be set to the upper position and the position of S3 does not matter.

Please note that there is a voltage drop of about 80mV between the USB connector and the +5V-IN pin of the ABR200. This is mainly caused by the USB protection components on the EVK200.

Also have in mind that the FDX reading range can decrease in case of using 5 volts from a USB port. The reason is that the USB voltage is allowed to go down a few hundred millivolts if some hundred milliamps are drawn. Please see the *"ABR200_Integration_Manual__eng"* document for further details.

2.1.3 Using the 3.3V LDO for power supplying the ABR200

In order to simulate operation from a battery, the EVK200 contains an on-board linear regulator which converts 5 volts from the step-down regulator to 3.3 volts. The 3.3 volts can be used for power supplying the ABR200. In this case the ABR200s boost converter will be used because the ABR200 needs 5 volts internally. The connection setup for this power supply version is shown below.



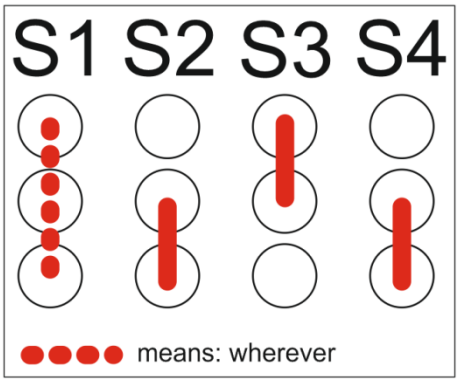
S2, S3 and S4 have to be set to the lower position and the position of S1 does not matter.

2.1.4 Power supply using the battery connector

You may also connect a battery to the EVK200 for power supplying EVK200 and ABR200. Alternatively a DC source with an adjustable voltage can be used.

Please do NOT apply more than 4.5VDC to the ABR200 (measured at BAT-IN), otherwise the ABR200 will get damaged irreversibly.

It should be considered that there is a voltage drop of up to 470mV between the battery connector ST4 and the BAT-IN pin of the ABR200. This voltage drop depends on the input voltage. So when using the EVK200 in this power supply version it is recommended to measure the input voltage between BAT-IN and Ground at the ABR200 pins.



The position of S1 does not matter. S2 and S4 have to be set to the lower and S3 to the upper position.

2.2 ENABLE jumper

The ENABLE jumper needs to be set for any input voltage option – without setting this jumper, the power supply on the ABR200 is not activated. This pin is connected to the supply voltage for the reader on the EVK200, so either to 5.0V or 2.2 to 4.5V.

2.3 Antenna tuning jumpers

The antenna builds a series resonant circuit together with the resonant circuit capacitors which are already on the ABR200. If the inductance of the antenna is lower than 275µH, additional capacitance needs to be added in order to tune the circuit to resonance. There are 4 binary staged capacitors on the EVK200, which might be added or removed via the antenna tuning jumpers. For further details about this topic please see the separate document *"ABR200_antenna_tuning_manual_eng"*.

2.4 Current jumper

This jumper is used for internal purposes only. It will be removed in later versions of the EVK200.

2.5 Interface connectors

The EVK200 provides two interface connectors, a 9-pole D-SUB connector for RS232 and a standard B-type USB connector. Both interfaces can be used simultaneously.

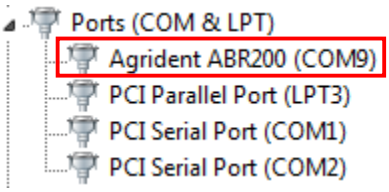
2.5.1 RS232 connector

The RS232 connector is a standard female 9-pole D-SUB connector. Together with the provided RS232 cable it can be connected to a RS232 port of a computer. If the computer does not have a 'real' RS232 port anymore, you might use an USB-to-Serial converter for testing this interface. In case of RS232 it is important, that the correct baud rate is selected in the PC Software.

2.5.2 USB connector

The USB connector is a standard B-type one. It can be connected to any desktop computer by using the provided USB cable. Please install the Agrident USB driver for Windows before connecting USB in order to allow an easy installation. If Windows fails to install a driver you need to update the driver manually in the device manager. In case of USB the baud rate setting does not matter since both devices automatically negotiate the connection speed.

The ABR200 appears with the ports friendly name "Agrident ABR200" in the Windows device manager:



If you are using another operating system (like Linux), you should look for a 'standard' USB-CDC-ACM driver.

2.6 GPIO connector

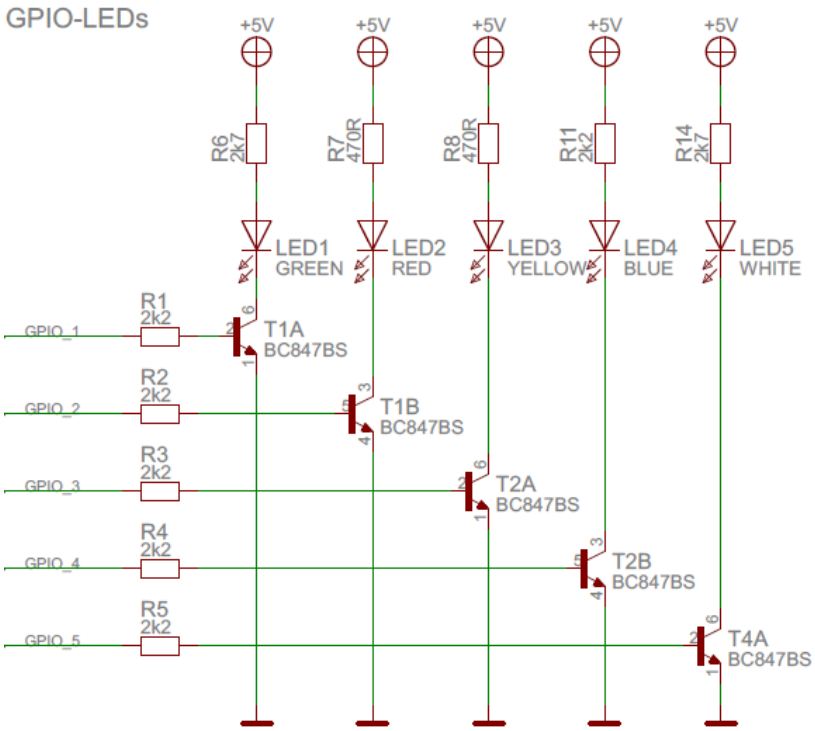
The ABR200 provides 5 GPIOs. Concerning the functions of the GPIOs please refer to the *"ABR200_Integration_Manual_eng"* document or to the next chapter *"GPIO LEDs"*. At the moment the configuration of the GPIOs is fixed.

On the ABR200 the GPIOs just have 1KΩ resistors between the processor and the connection pins. Hence the GPIOs cannot be used to drive an LED, for example. If LEDs should be controlled via the GPIOs, it is necessary to provide additional transistors.

The GPIO connector is directly connected to the GPIO pins of the ABR200.

2.7 GPIO LEDs

On the EVK200 there are additional transistors and LEDs for indicating the status for each GPIO. The schematic looks as follows:



If the GPIOs should be connected to LEDs for indicating a particular reader status, a schematic similar to the one above should be used on the customers PCB.

The next table shows the currently used configuration of the GPIOs. This will always remain the factory default configuration for the ABR200.

GPIO	LED on EVK200	Function	Description
1	green	Read	indicates a successful tag read
2	red	RF-On	indicates that the RF-field is activated
3	yellow	Power	indicates that the module power is switched on
4	blue	RFU	reserved for future use
5	white	PWM_Out	PWM output for synchronizing external switch-mode regulators; frequency depends on BAT-IN voltage

At the moment, all GPIOs are configured as outputs.

3 Using the EVK200 with ASR-PC-Demo

Although developed for Agrident Stationary Readers, the PC-Software ASR-PC-Demo can also be used for the ABR200 together with the EVK200. The software can be used for requesting or applying the reader configuration, to show or log received transponders, to request the reader status (voltages and diagnostic functions) or to see the serial communication between the PC and the ABR200 (Serial Monitor).

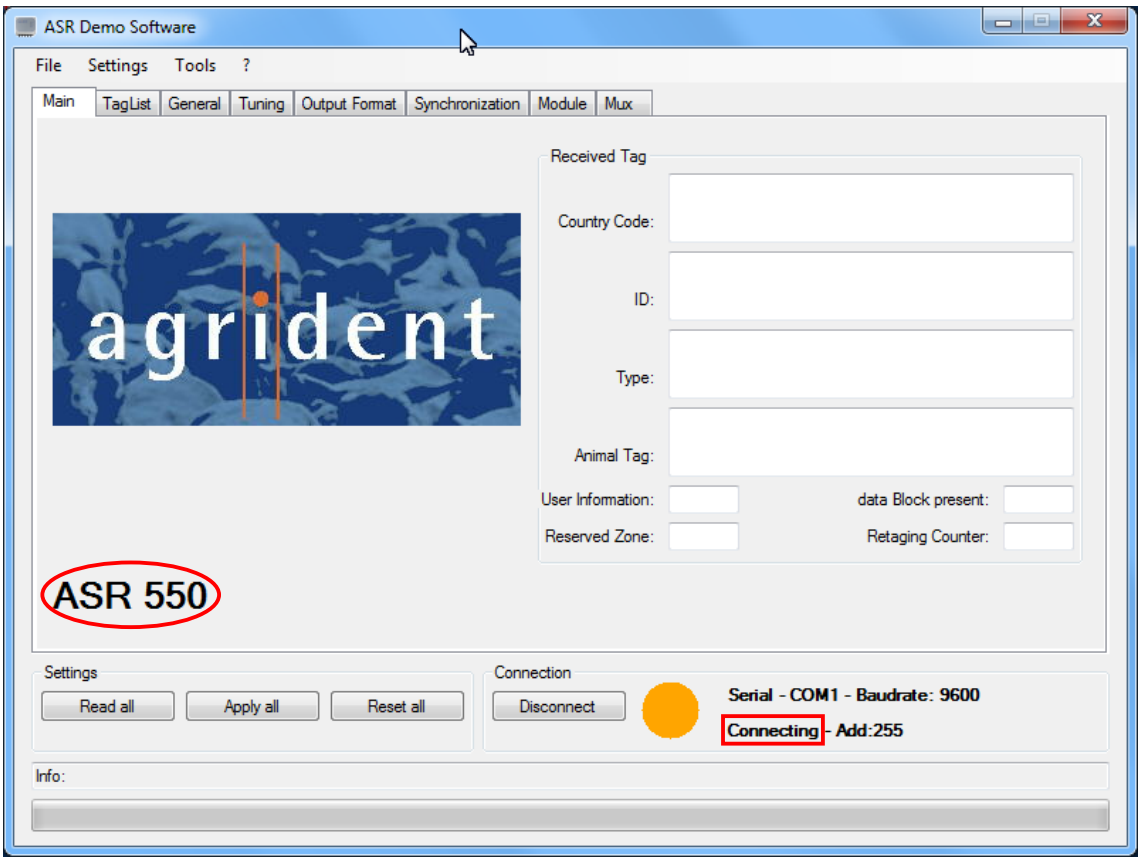
3.1 Installing the PC-Demo Software

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.

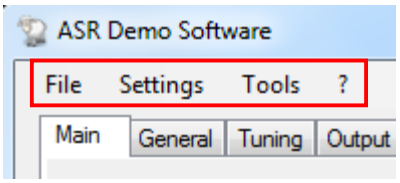
3.2 Starting the PC-Demo Software

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



Since the Software was not able to connect to the ABR200, the default reader “ASR550” is shown. In order to show the correct device, the connection settings might need to be changed according to the desired interface and depending on the comports on your computer.

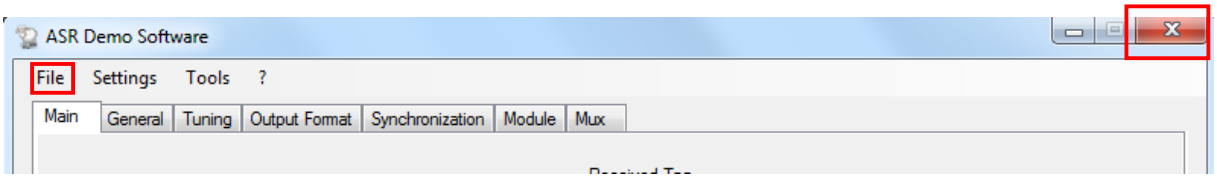
3.3 The Menu Bar



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

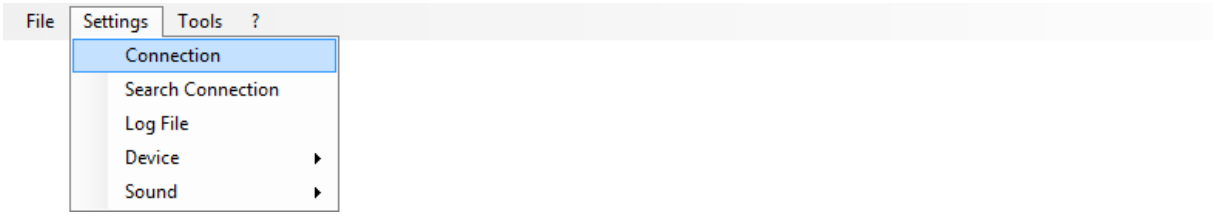
3.3.1 File

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:



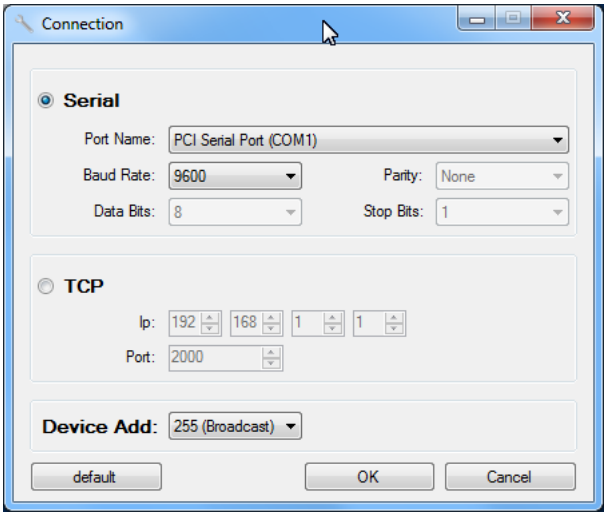
3.3.2 Settings

The file menu "*Settings*" contains the menu items "*Connection*", "*Search Connection*", "*Log File*" "*Device*" and "*Sound*".



3.3.2.1 Connection

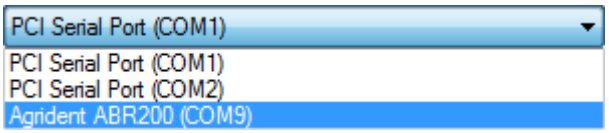
If you press "*Connection*" an additional window opens. Here you have to select the interface type and the corresponding settings.



The option "*TCP*" is only available for an ASR with Ethernet or Wi-Fi connectivity.

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 ABR200 has to match with the selected baud rate of the PC-Software in case of using the UART interface (RS232 on the EVK200) – otherwise the communication will not work. Per factory default, the readers baud rate is set to 9600.

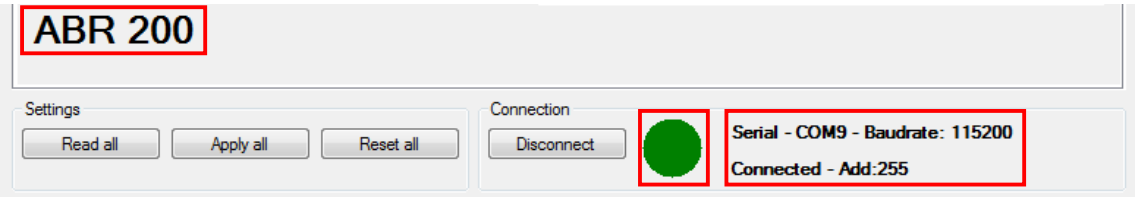
In case of having the ABR200/EVK200 connected via USB, you should see the correct port with the friendly name "*Agrident ABR200*". The port name itself will vary on your system.



Please ensure that the USB-Driver is installed before connecting an ABR200 via USB for the first time. In case of connecting via USB, the configured baud rate does not matter since both devices automatically negotiate the connection speed.

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.

You should also see the connected reader type now, here "ABR200":

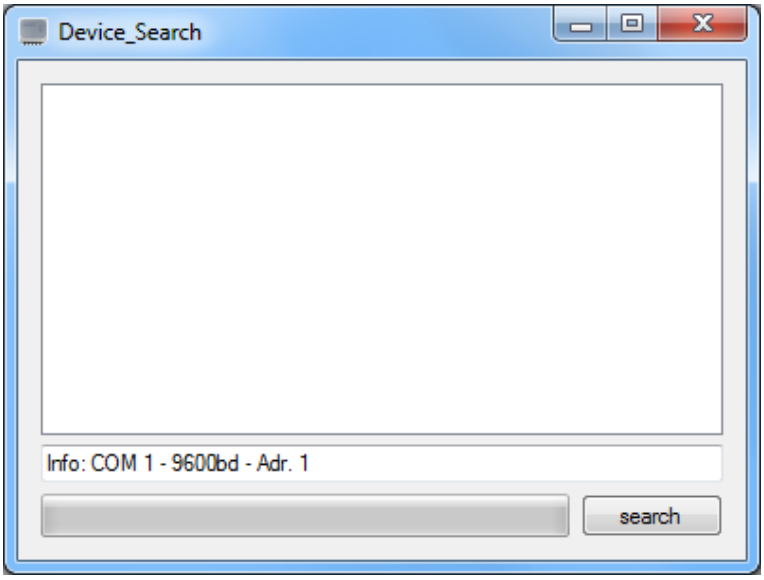


The address "255" (0xFF) means broadcast. Please see the ABR200 protocol description for further details. In case of the ABR200 different addresses should not be necessary since it does not work on bus systems.

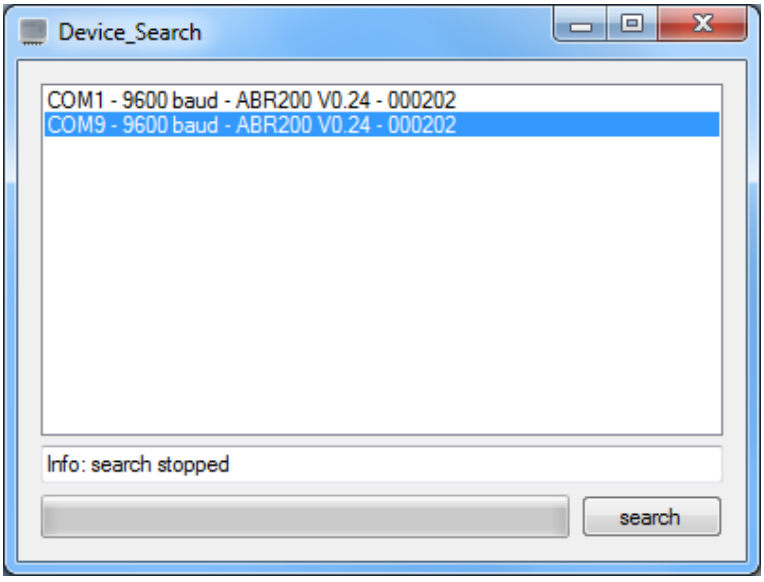
Please keep in mind that each comport can only be accessed by one program. If you want to use other software for communicating with the reader, please close ASR PC-Demo before or at least click on "Disconnect" in the main window.

3.3.2.2 Search connection

You may also let ASR-PC-Demo detect Agrident readers automatically. Therefore please click on "*Search connection*" in the "*Settings*" menu. Another window opens:



Press search in order to start the scan. The software will check all available ports with all possible baud rates. After the search was finished, the result is displayed.

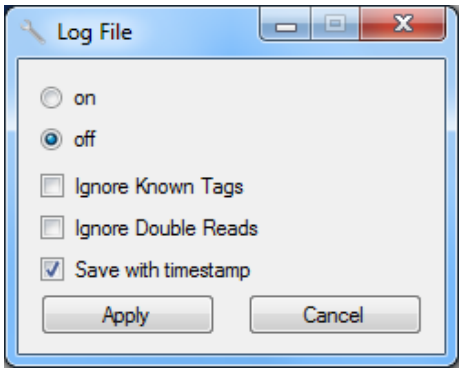


In this example PC software found 2 devices. By having a closer look you can see that it is one and the same device. The first entry was found on COM1, which is an RS232 port in this case. The device was found with a baud rate of 9600. The second entry is the same reader but a different port, which is the connected USB port here. As mentioned before, the baud rate does not matter for USB.

Double click on the corresponding entry in order to connect to the device.

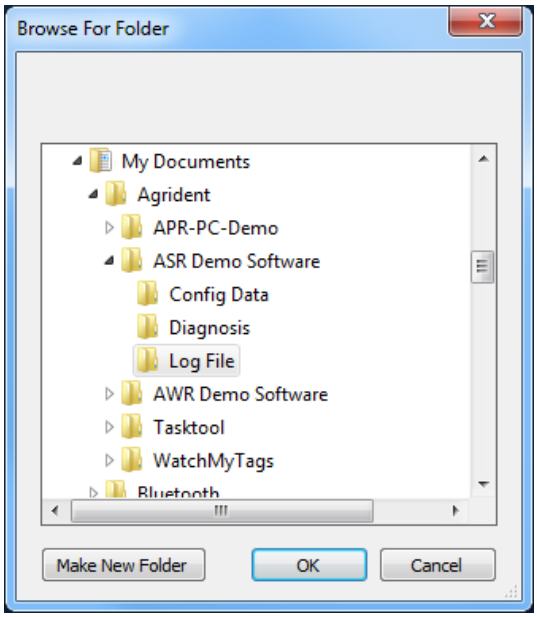
3.3.2.3 Log File

If you press "*Log File*" in the "*Settings*" menu, 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 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 in the log.

As soon as you have activated the radio button "*On*" and you have pressed "*Apply*", a small explorer window opens which allows you to select a file location for the log file.



Select the desired destination folder and confirm by clicking on "*OK*". You may also create a new folder from here.

The content of the tag list looks like this:

```
ASR Tag List
999 000000010007 2013.16.12 18.35.07
999 000000010012 2013.16.12 18.35.09
999 000000010002 2013.16.12 18.35.11
999 000000010008 2013.16.12 18.35.11
999 000000010001 2013.16.12 18.35.13
999 000000010003 2013.16.12 18.35.14
```

1. **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.

2. **Ignore Double Reads**

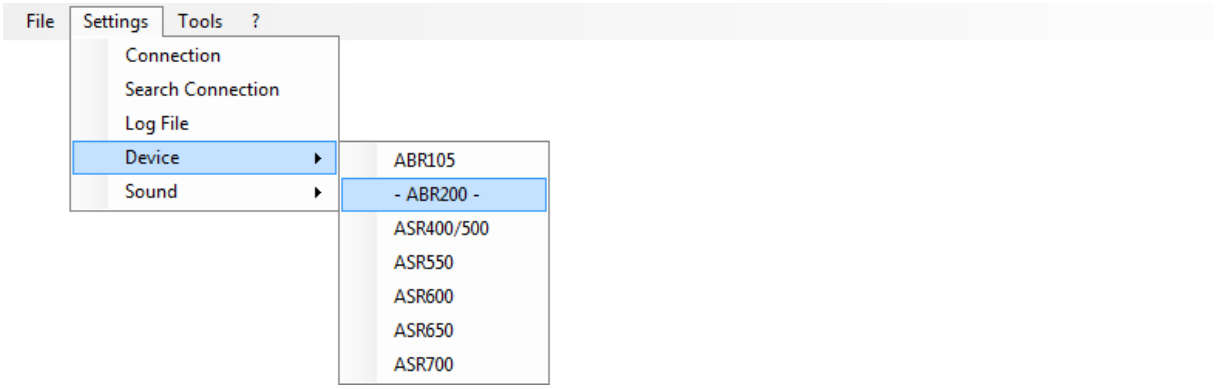
If the reader transmits one and the same ID again and again, it will be written into the log file only once if this checkbox is activated. If a different ID is read meanwhile, the previous ID will be added to the log again next time it is read. So “Double Reads” only refers to ONE transponder number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

3. **Save tag with timestamp**

It is possible to save the time stamp with each transponder number. In this case the timestamp is taken from the PC clock since the reader does not have an internal clock.

3.3.2.4 Device

This submenu allows choosing the reader product you are using. The default setting is the ASR550, but other reader models (incl. ABR200) are supported as well. It makes sense to select the device manually if you want to evaluate diagnosis data “offline”, i.e. with no reader connected. Previous reader models save diagnostic data different from the newer ones, like the ABR200.

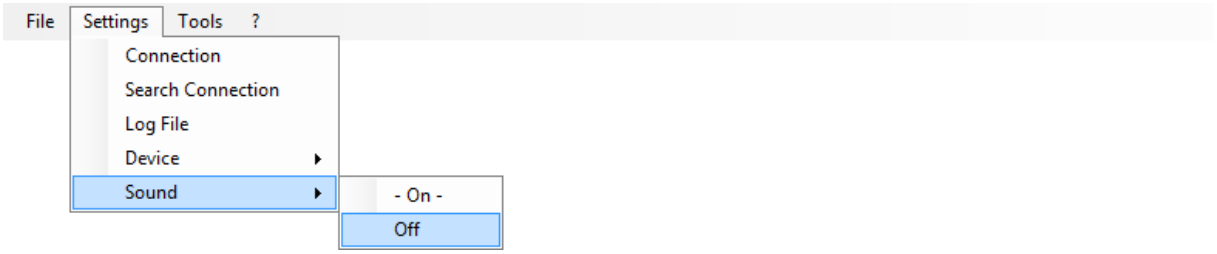


Just click on the reader model you want to select. The available menu items and the content of the tabs in the main window will change according to the reader model you have selected. Not all models support all functions and commands.

Please have in mind that ASR-PC-Demo will automatically select the correct reader model as soon as a version request has been answered successfully after a new connecting attempt. That means that your previously selected device might not be selected anymore.

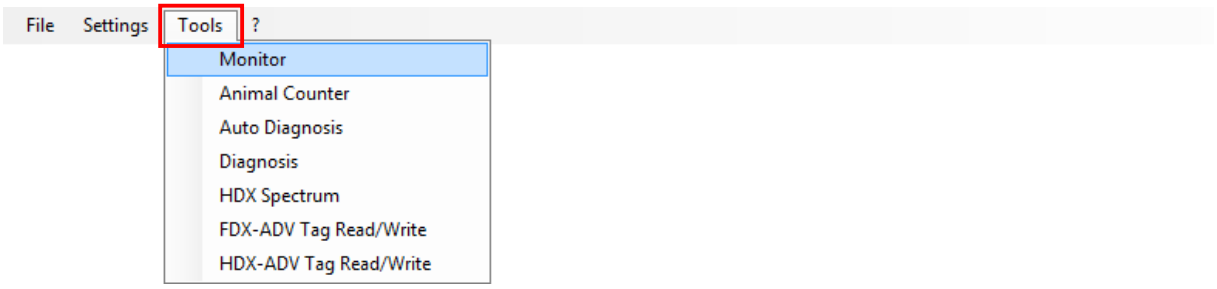
3.3.2.5 Sound

The PC-Software plays a sound via the speakers if a tag has been read and the speakers are switched on. If you don`t want to hear this sound you can deactivate this function here:



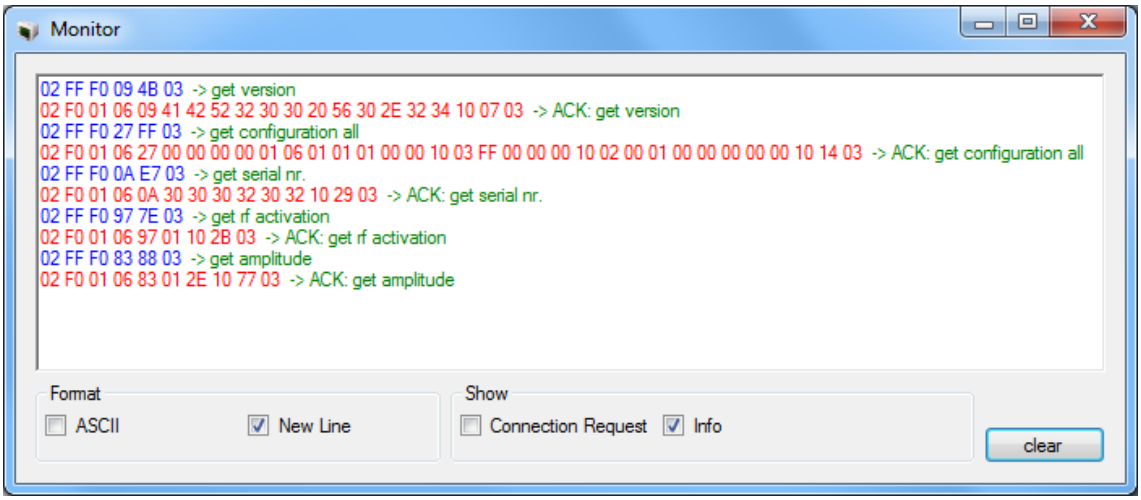
3.3.3 Tools

The section Tools contains the submenus "*Monitor*", "*Animal Counter*", "*Auto Diagnosis*" "*Diagnosis*", "*HDX Spectrum*", "*FDX-ADV Tag Read/Write*" and "*HDX-ADV Tag Read/Write*".



3.3.3.1 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.

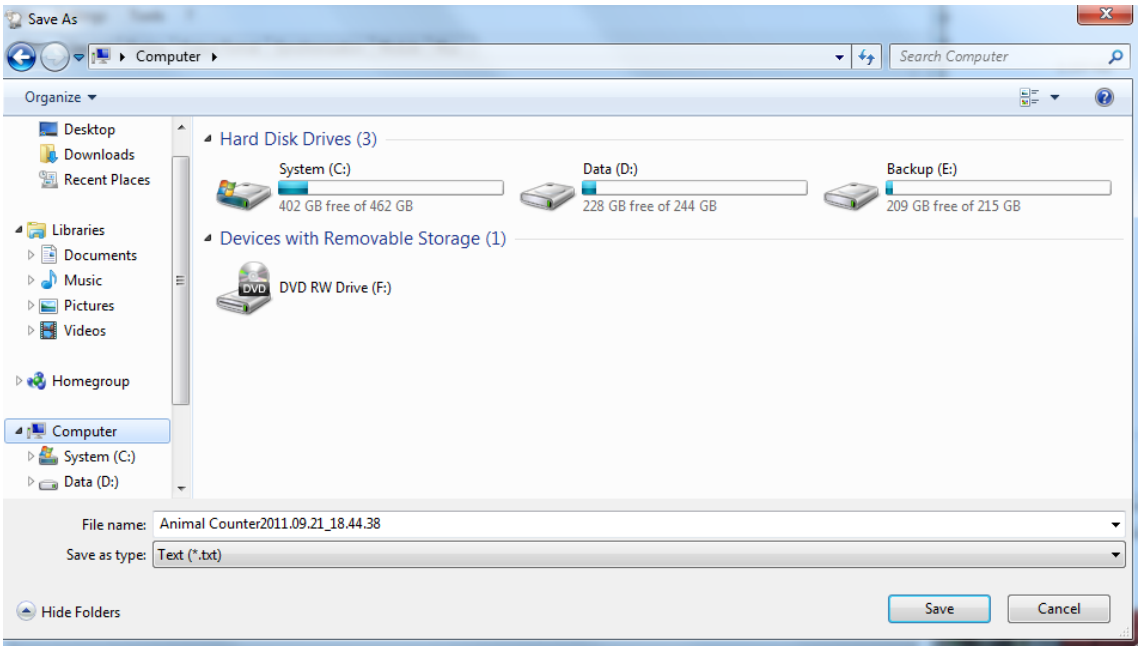


For further details please refer to *"ABR200_Protocol_Description_eng"*.

3.3.3.2 Animal Counter

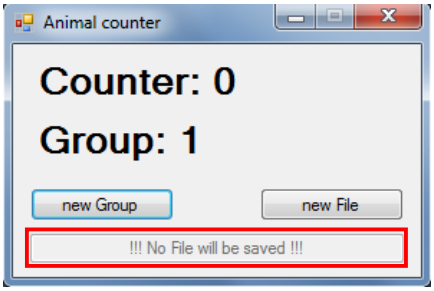
The Animal Counter works similar to the already mentioned log file with the option "*Ignore Known Tags*" activated. Nevertheless there are some differences.

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

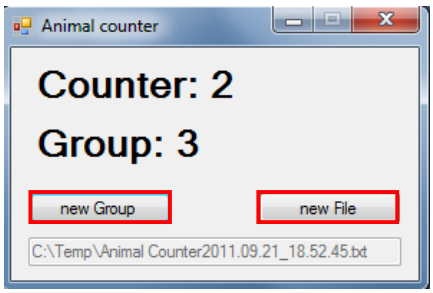


Please choose a folder where you want to save the file containing the read transponders to. The file will be saved as a text file with the default name "*Animal Counter*" followed by date and time. You might also change this default name, of course.

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.

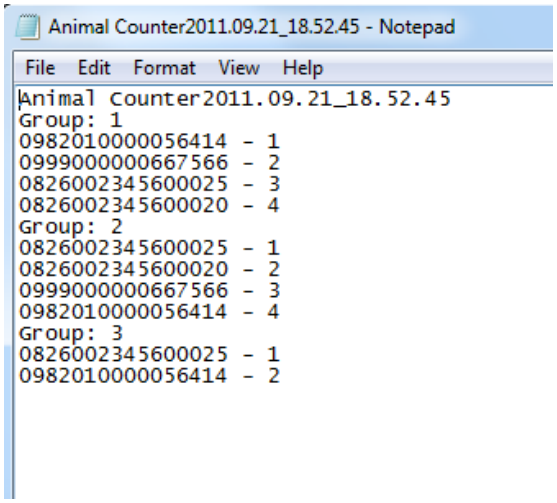


If you decided to save a file, the selected path will be displayed. When you are reading transponders now, the counter is increased as soon as a new, unknown, tag has been read. In addition they will be written into the corresponding text file.



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.

3.3.3.3 Auto Diagnosis

Although this function makes more sense for troubleshooting for stationary readers, you may use it with the ABR200 as well. The Auto-Diagnosis automatically requests all possible diagnostic data from the reader and stores them to a previously determined folder on your PC. These data can be used for later analysis.

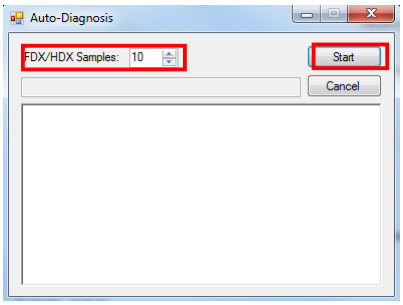
There are generally two possible reasons for a decreased reading performance:

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

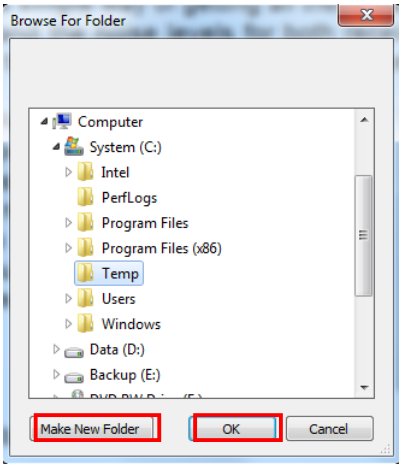
2. Electromagnetical interference – often referred as “noise”.

The Agrident readers 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. The collected data are intended to be sent to technical staff for further evaluation.

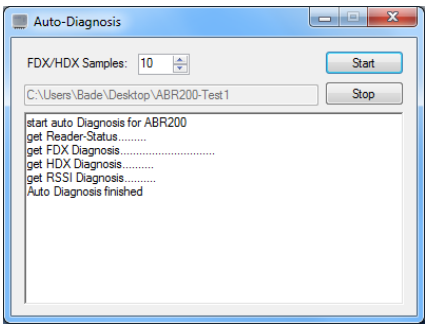
When you click on “*Auto Diagnosis*” the following window will appear. Per default, the Demo Software will request 10 of each samples – FDX and HDX and the HDX RSSI. Since noise is not static, it always makes sense to save more than 1 sample per channel. You can press “*Start*” in order to continue or 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 the reader status and the selected number of diagnosis samples. The data will be saved into the folder you have selected previously. You can now navigate to that folder and send the complete diagnosis data to technical experts. You may also pack the files using WinZip, WinRar or a similar tool.



3.3.3.4 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 readers receivers. It can be a very powerful tool for troubleshooting. Nevertheless it is a quite complex issue and thus it will not be described here any further, but in a separate manual.

3.3.3.5 HDX Spectrum

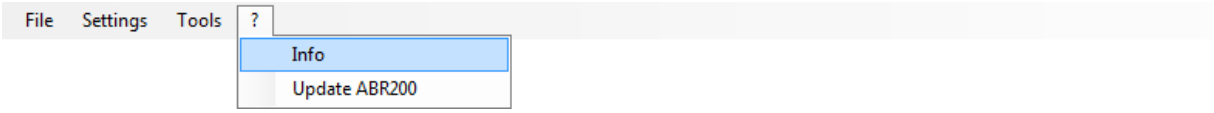
This function opens a kind of spectrum analyzer screen. The information are sampled from the HDX receiver of the ABR200 and they can help to identify a particular frequencies which appear as noise. In addition you could also have a look at the frequencies transmitted by an HDX tag.

3.3.3.6 Advanced Tag Read/Write functions

The ABR200 already supports advanced transponders according to ISO14223. Beside Anti-Collision for HDX-Advanced this also includes Read- and Write functions. Please refer to the separate manual "*ISO14223-AdvancedTagFunctions_Agrident_eng*" for details.

3.3.4 Help

The "*?*" menu contains the menu item "*Info*" and *"Update ABR200"*.



3.3.4.1 Info

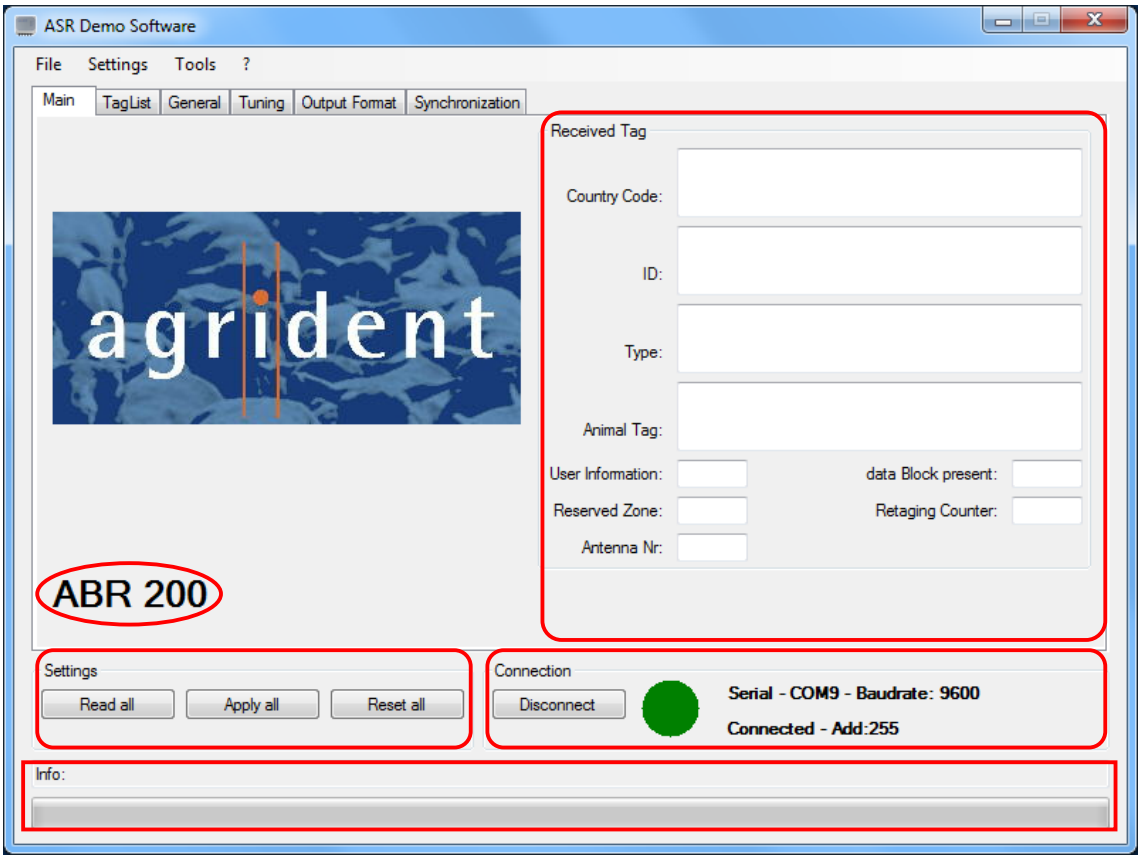
Here you can see the current version of the PC-Demo software. You may also open the Agrident Website from this info box.

3.3.4.2 Update ABR200

From this menu the Firmware Update can be started manually. But ASR-PC-Demo also notifies the user automatically if a newer Firmware than the current one is available after a successful connection.

The updater is started with the currently used comport and baud rate. These settings can also be selected in the updater but the passed parameters from the PC-Demo should be correct.

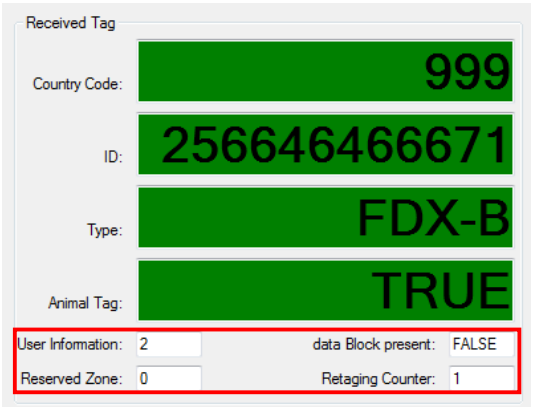
3.4 The Main-Window of the PC-Demo Software



After the Demo Software was started and the connection to the reader 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 ABR200.

3.4.1 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.



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

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

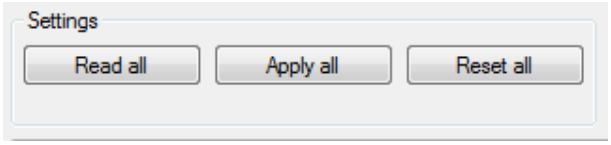
Transponder Type, if supported by the selected output format (FDX-B or HDX)

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".

3.4.2 Settings

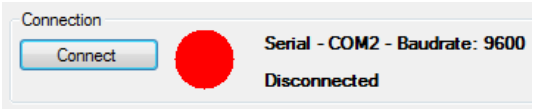
These buttons are available within all tabs of the main window. "*Read all*" requests all reader settings in one step, independently of the tab which is currently active. "*Apply all*" is similar but will send all settings to the ABR200. "*Reset all*" will set the reader back to factory default values.



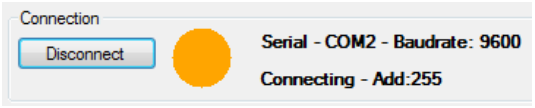
Please note that there is no additional "Save" command necessary for storing the configuration to the reader's non-volatile memory like it had to be done for the previous OEM reader module ABR105.

3.4.3 Connection

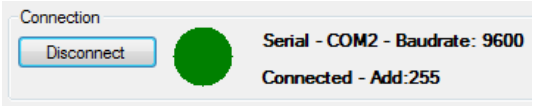
As already mentioned earlier in this manual, the *"Connection"* area indicates the serial connection status of the reader. There are three possible conditions:



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 "*Connection*" in the file menu "*Settings*".



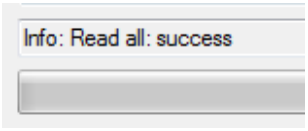
The PC-Demo Software opened the port and tries to connect to the reader. If this does not succeed after some seconds, please check your port settings again.



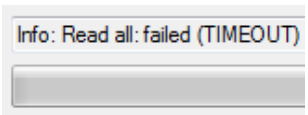
The program could connect to an Agrident reader successfully. The complete reader settings (from all tabs) are requested and filled in into the corresponding fields automatically.

3.4.4 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.

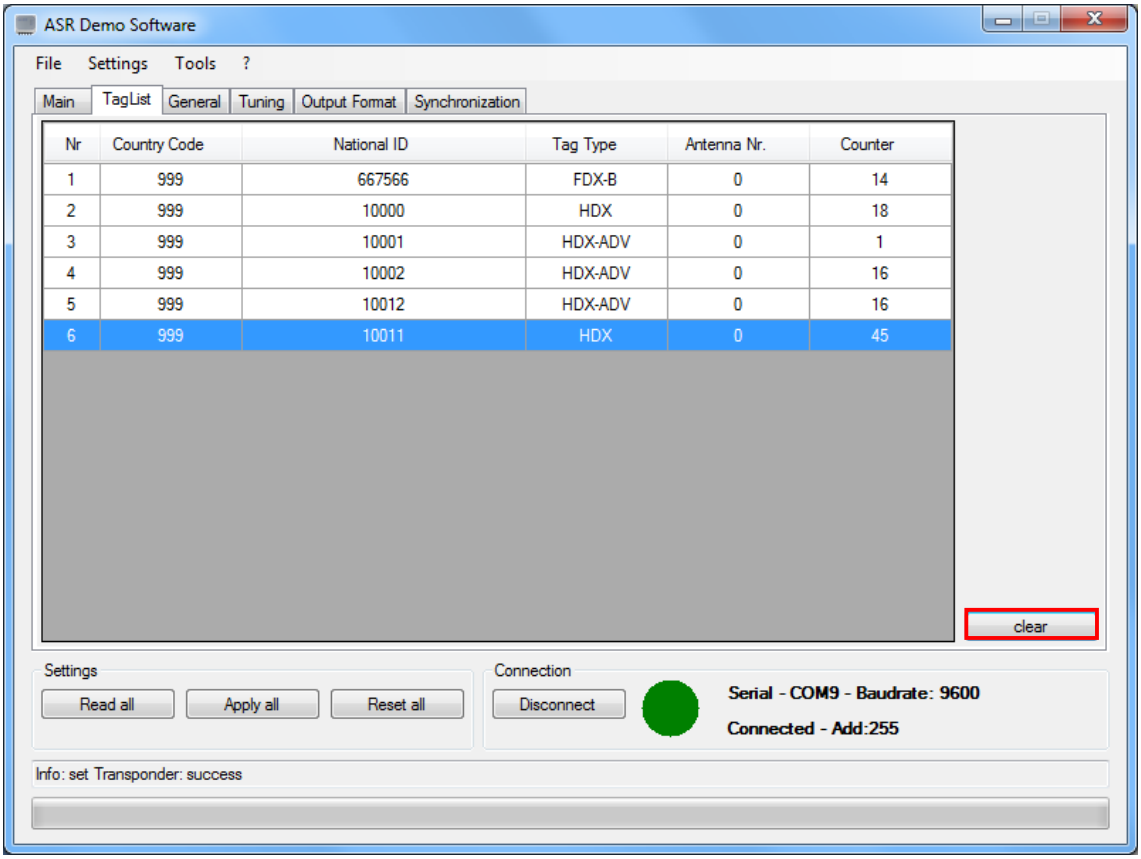


As we can see here, the command could not be sent to the reader successfully, i.e. there was no response received from the reader.

This works similar for all other "*set*" or "*get*" operations.

3.5 TagList

The tab "*TagList*" can be used to view a list of read transponders. You can see which tag has been read how many times. If supported by the configured output format, you can also see the tag type. The antenna number is only important if a stationary reader with antenna multiplexer is used.

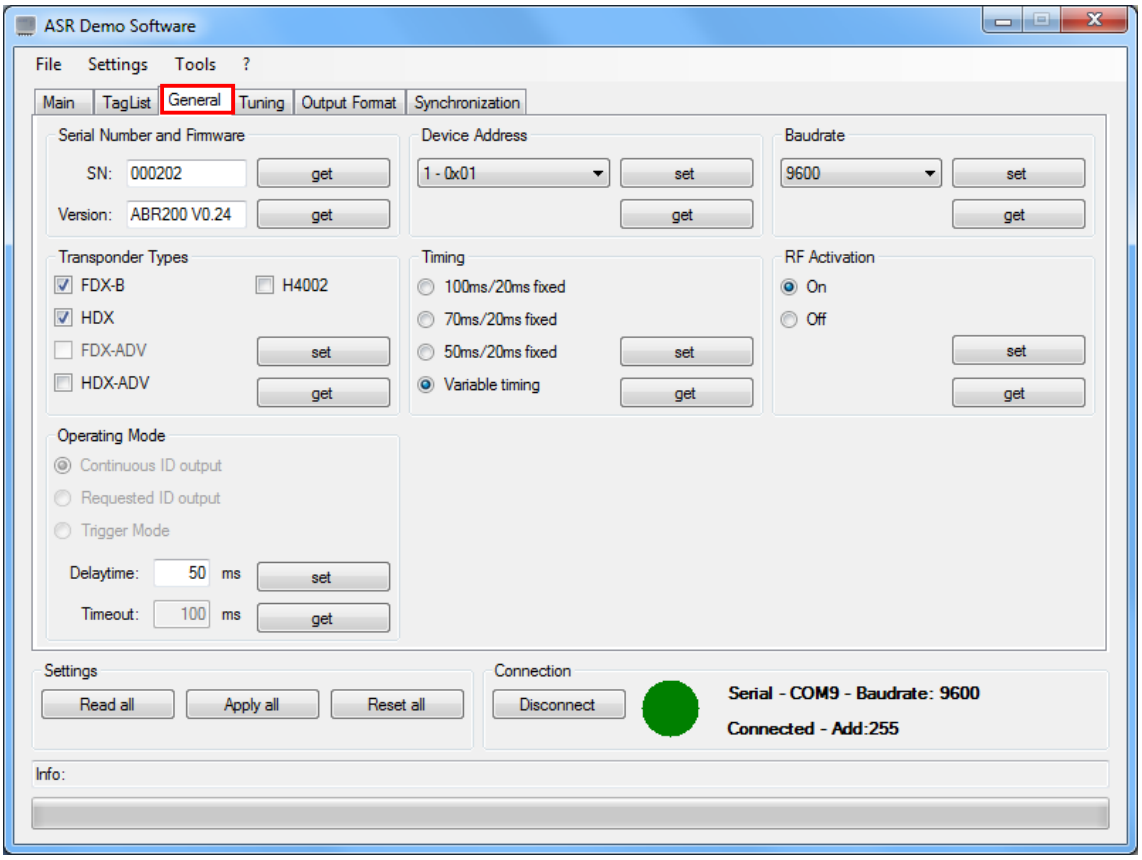


The button "clear" empties the list. In this example some HDX-ADVANCED tags have been read as well. Reading HDX-ADV tags requires to activate this tag type first!

Nr	Country Code	National ID	Tag Type	Antenna Nr.	Counter
1	999	667566	FDX-B	0	14
2	999	10000	HDX	0	18
3	999	10001	HDX-ADV	0	1
4	999	10002	HDX-ADV	0	16
5	999	10012	HDX-ADV	0	16
6	999	10011	HDX	0	45

All of the above shown HDX tags are HDX-ADV tags. The reason why two of them are shown as "HDX" is that there was not data collision happening. In this case these tags behave as standard HDX tags.

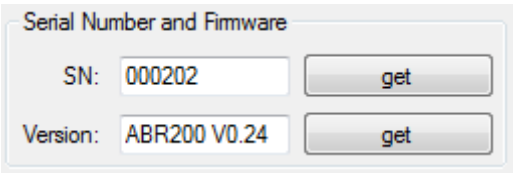
3.6 General Settings



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

3.6.1 Serial Number and Firmware Version

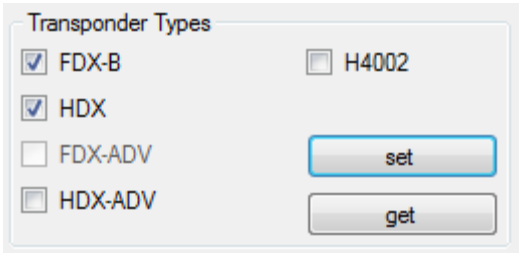
You can request the 6-digit Serial Number of the reader, which corresponds with the ID Label on the printed circuit board. You may also request the currently used Firmware version.



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

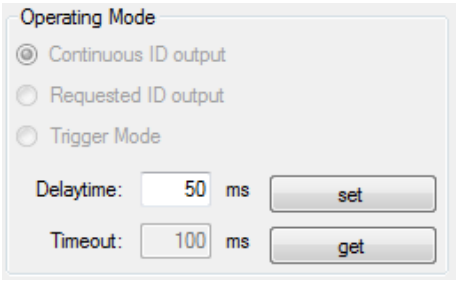
3.6.2 Transponder Types

Since the ABR200 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. In addition HDX-ADV and EM4002 (H4002) tags can be read if the corresponding boxes are checked.



3.6.3 Operating Mode

Unlike the stationary readers, the ABR200 has only one operating mode: *"Continuous ID output"*. In this operating mode the reader has its RF-field activated permanently and the ID is transmitted via UART and USB automatically and repeatedly. Because there is only this operating mode for the ABR200, the other modes are greyed out.



The repeated transmission of one and the same ID can be controlled via the setting "*Delaytime*". Please refer to chapter 3.6.3.1 for details.

If necessary, the RF-field can be switched on or off by commands.

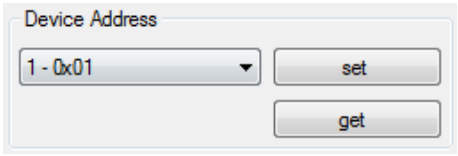
3.6.3.1 Delaytime

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 repeatedly directly after reading.

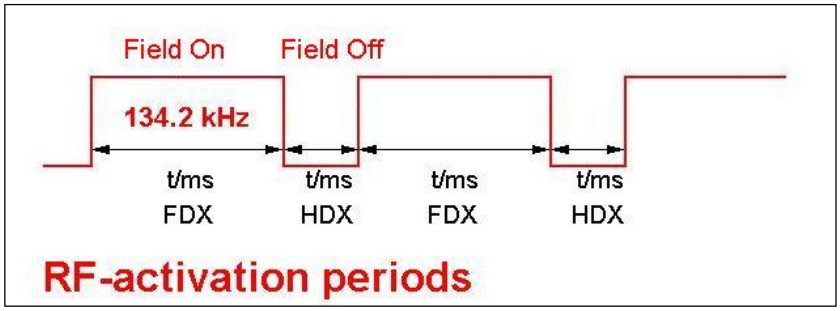
3.6.4 Device Address

Although it does not really make sense to change the device address for the ABR200 (point-to-point connections only, no bus), it is possible. The default device address is 0x01.



3.6.5 Timing

In order to allow the ABR200 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 reader 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:

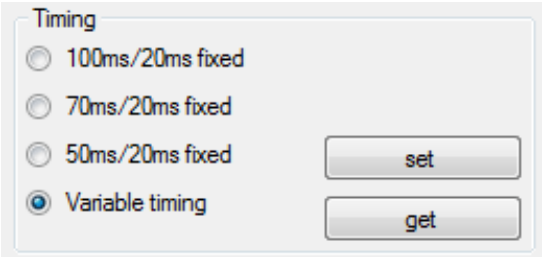
FDX tag present?	HDX tag present?	Field-On time	Field-Off time
No	No	50ms	4ms
Yes	No	50…100ms	4ms
No	Yes	50ms	20ms
Yes	Yes	50…100ms	20ms

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 ABR200 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 an HDX tag at all in case of using 70:20 or 100:20.

Select the timing you want to use for your application and press the "*set*" button. After a reset to factory defaults, the ABR200 will always use the variable timing again.

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



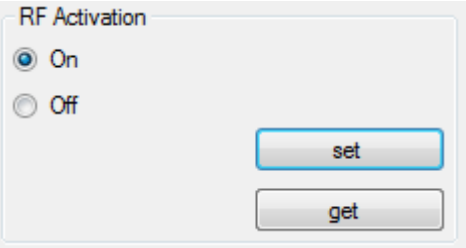
3.6.6 RF-Activation

For certain applications it might be necessary to switch the RF-field on and off manually.

This setting will not be written into the EEPROM, just into the RAM; so this setting is only active as long as the ABR200 is not re-started.

Please select the intended radio button and press "*set*" in order to switch the RF-field on or off. After restarting the reader, the RF-field will always be activated.

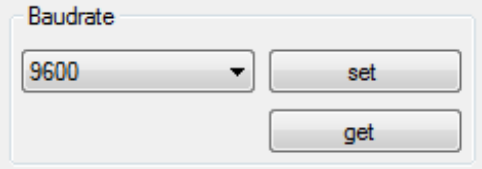
The "*get*" button request the current status of this setting.



3.6.7 Baud Rate

The ABR200 provides a UART interface with a configurable baud rate. In case of using USB this setting does not matter since USB devices negotiate their connection speed automatically.

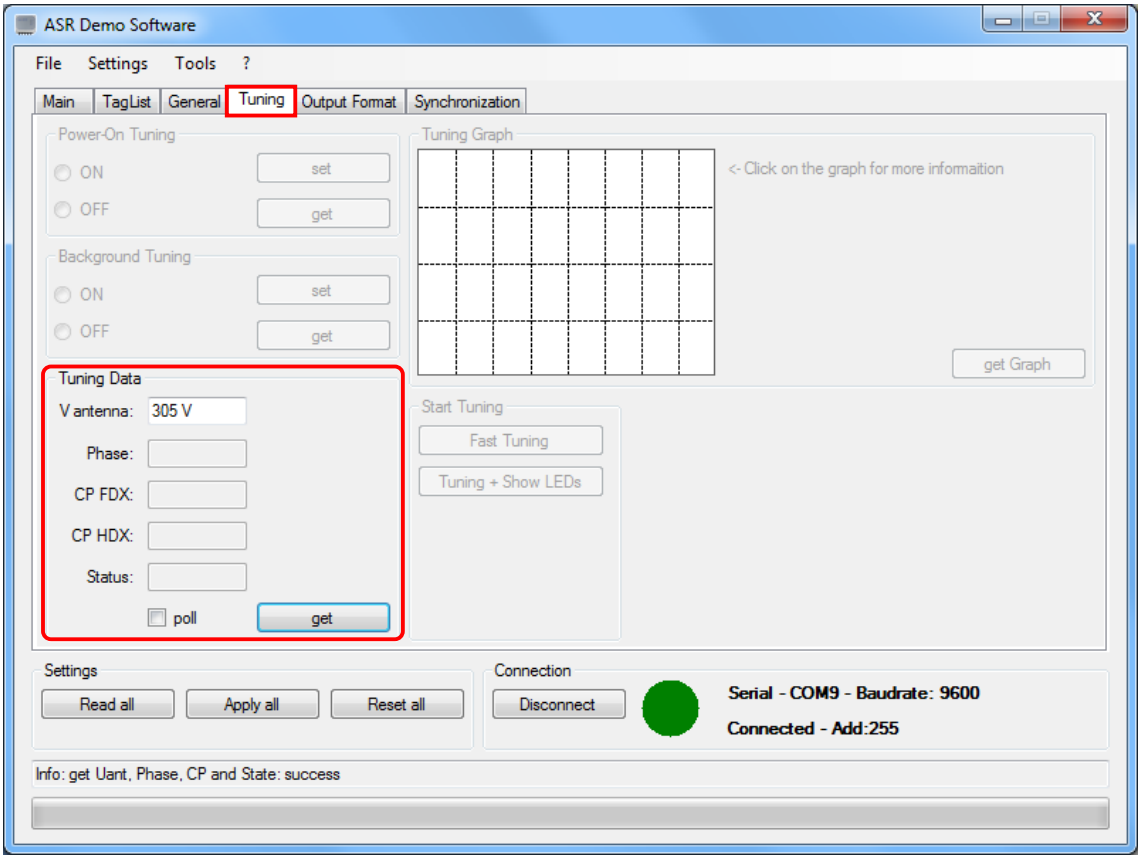
Choose the intended UART baud rate and confirm with *"set"*. The actual setting can be requested via *"get"*.



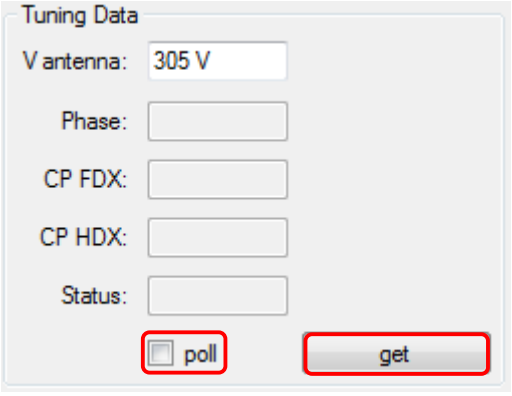
It is absolutely important that the baud rate of any PC-Software or customized controller is the same as the configured baud rate for the reader (UART only). If this is not the case, communication will not work at all.

3.7 Tuning

For the ABR200 this tab can be used to request the antenna voltage only. All other options are only available for stationary readers which contain the Autotuning feature.



The antenna voltage can be requested from the ABR200 by pressing the *"get"* button. The voltage depends on the antenna Q (inductance and resistance). In this example the antenna Q is pretty high (>>100) and thus the antenna voltage is also fairly high (but absolutely ok).



In order to request the antenna voltage repeatedly you can check the box *"poll"*. The PC-Software will request the readers antenna voltage until the box is unchecked again. This can be useful while moving the coil on a ferrite rod in order to tune to the correct inductance.

3.8 Output Format

3.8.1 Introduction

The ABR200 offers a lot of different output formats. Some formats use a transmission frame according to the Agrident 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 microcontroller.

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 protocol on order to get the information out of the telegram.

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

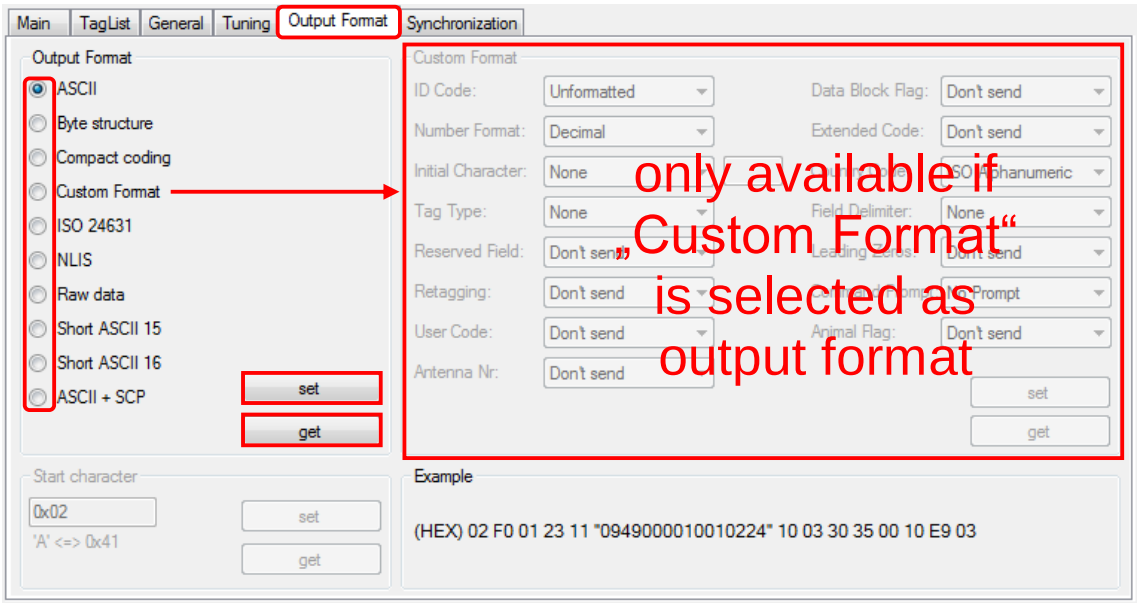
- ASCII
- Byte structure
- Compact coding
- Raw data

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

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

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

3.8.2 Changing the output format



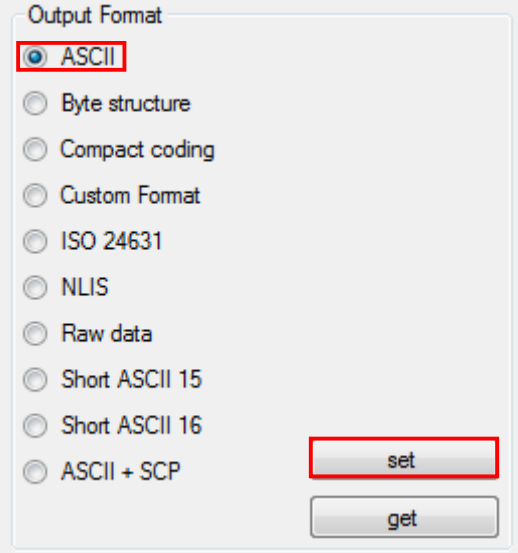
In order to change the output format, please select a format first. By pressing the "*set*" pushbutton the setting is send to the reader and saved automatically. The current configuration can be read out via "*get*".

3.8.3 Output Formats description

This chapter deals with the different output formats and explains the ones without transmission frame in detail. Formats using the frame according to the Agrident 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 protocol description document.

3.8.3.1 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 "*ABR200_Protocol_Description_eng*" document.



In order to set ASCII as the output format, select the radio button ASCII and press *„set"*. This format is also the ABR200 default output format.

3.8.3.2 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 "*ABR200_Protocol_Description_eng*" document.

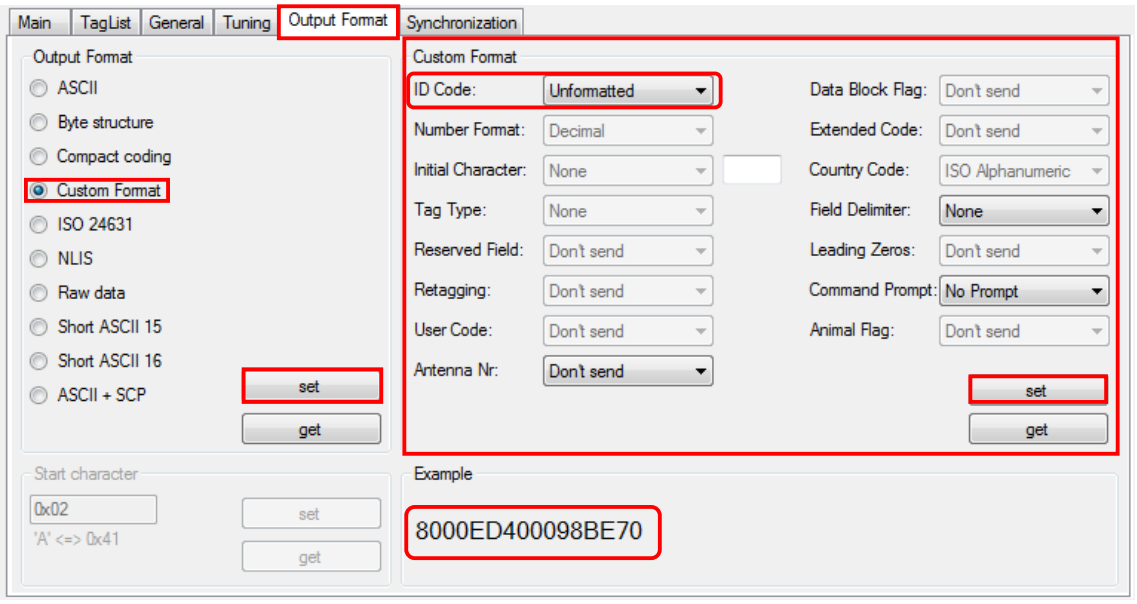
3.8.3.3 Compact coding

The format *"Compact coding"* is using the transmission frame as well. 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 "*ABR200_Protocol_Description_eng*".

3.8.3.4 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:

You want the ASCII character “A” as initial character.

Enter “A” into the corresponding field → ASCII character

or

Enter “0x41” into the corresponding field → Hex value of the ASCII character A

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

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

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

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

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

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

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

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

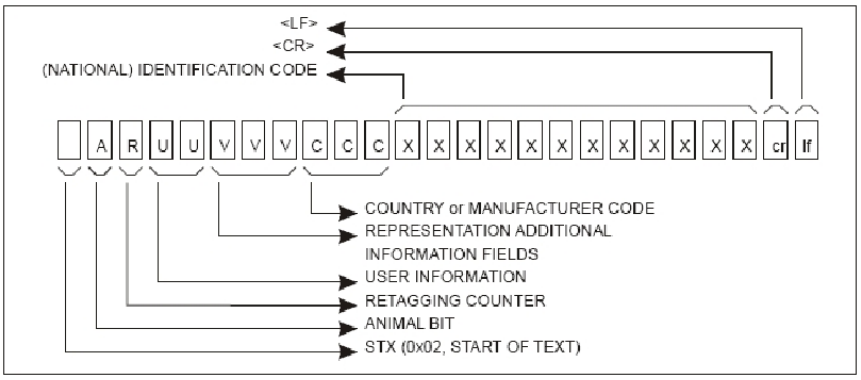
Leading Zeroes		
		Example
Don’t Send	does not send leading zeroes	980 123456
Send	does send leading zeroes	980 000000123456

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

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

3.8.3.5 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".

3.8.3.6 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

3.8.3.7 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 "*ABR200_Protocol_Description_eng*".

3.8.3.8 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

3.8.3.9 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

3.8.3.10 ASCII + SCP

The format *"ASCII + SCP"* does not use a transmission frame. Only the last 10 digits of the national identification code are transmitted.

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

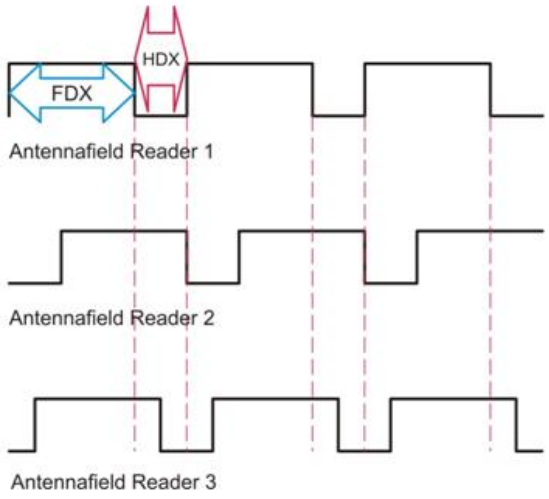
ID0...ID9 '0900316358'
CR 0x0D
LF 0x0A

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

3.9 Synchronization

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

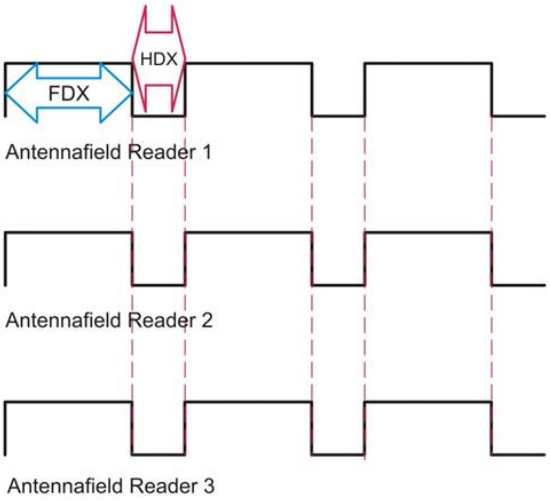
The example on the right shows that the readers are not synchronized. If reader 1 tries to read an HDX tag when the field is switched off, it might fail in this scenario. The reason is that readers 2 and 3 have their fields activated at this time; that means they transmit on the same frequency like the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



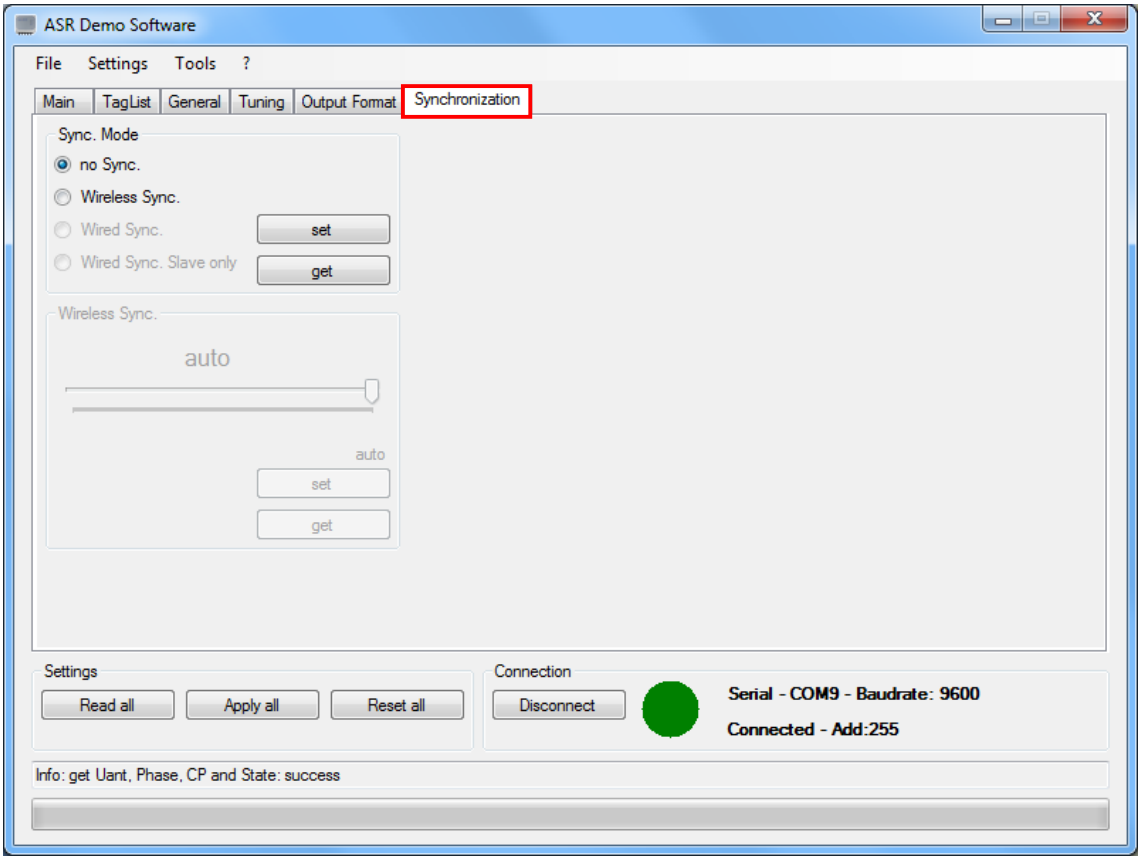
The solution for this problem is “Synchronization”. There are particular mechanisms which ensure that the timing of several readers is strictly synchronized.

In this example the readers are synchronized. The field on / off cycles are synchronous. There is always **one** Sync. Master, all other readers 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 ABR200 for synchronizing with other readers.



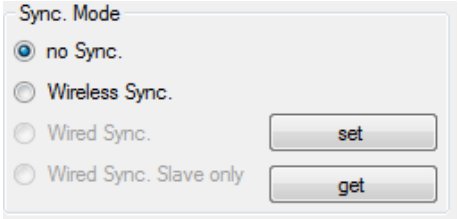
Per default, synchronization is disabled. If *Wireless Sync.* is not activated in the *Sync. Mode* section, the advanced *Wireless Sync.* settings are greyed out and thus not available. The options for wired synchronization are also not selectable because the ABR200 is supposed to operate in mobile devices which do not allow to use cables for synchronizing.

There is no particular Sync. Master – the readers decide independently which one is the Master. If the Master reader stops working, another reader will automatically take over the role of the Sync. Master.

3.9.1 Sync. Mode

There are only two different settings possible:

1. no Sync.
2. Wireless Sync.



1. No Sync. Mode

Using this setting, which is also the factory default value, the ABR200 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 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 stationary readers to a fixed timing of **50:20ms** – if there are no other reasons which would speak against that. The latest Agrident stationary readers support Wireless Sync. as well as reading FDX tags within 50ms.

2. Wireless Sync. Mode

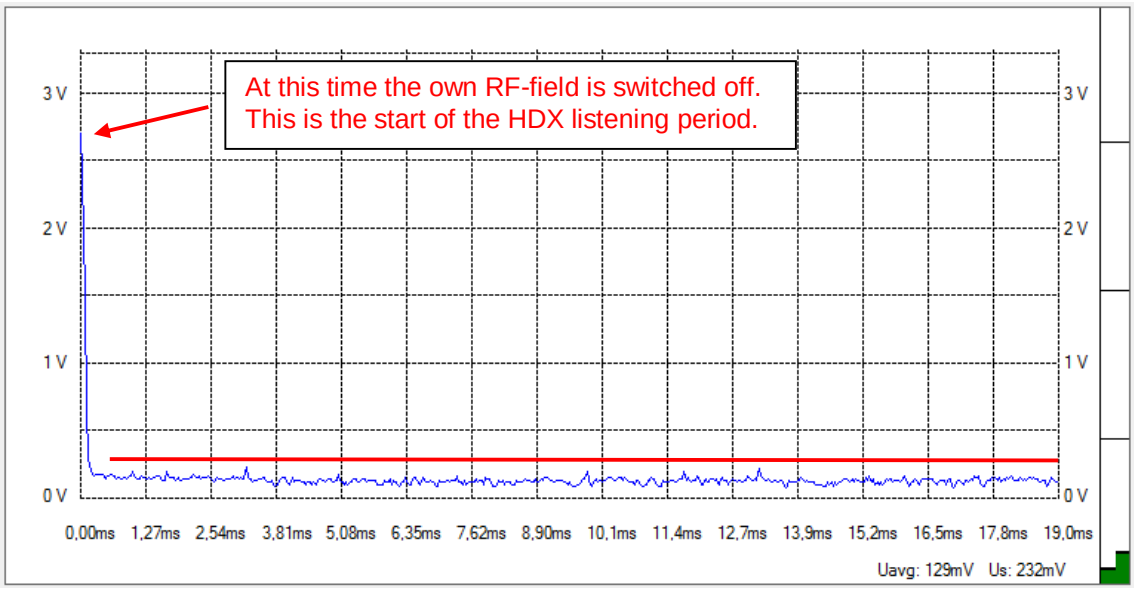
In order to use *Wireless Sync.* you have to activate this option as *Sync. Mode* setting first. More details about this option will be explained in chapter 3.9.2.

3.9.2 Wireless Sync. Level

How does Wireless Synchonization work?

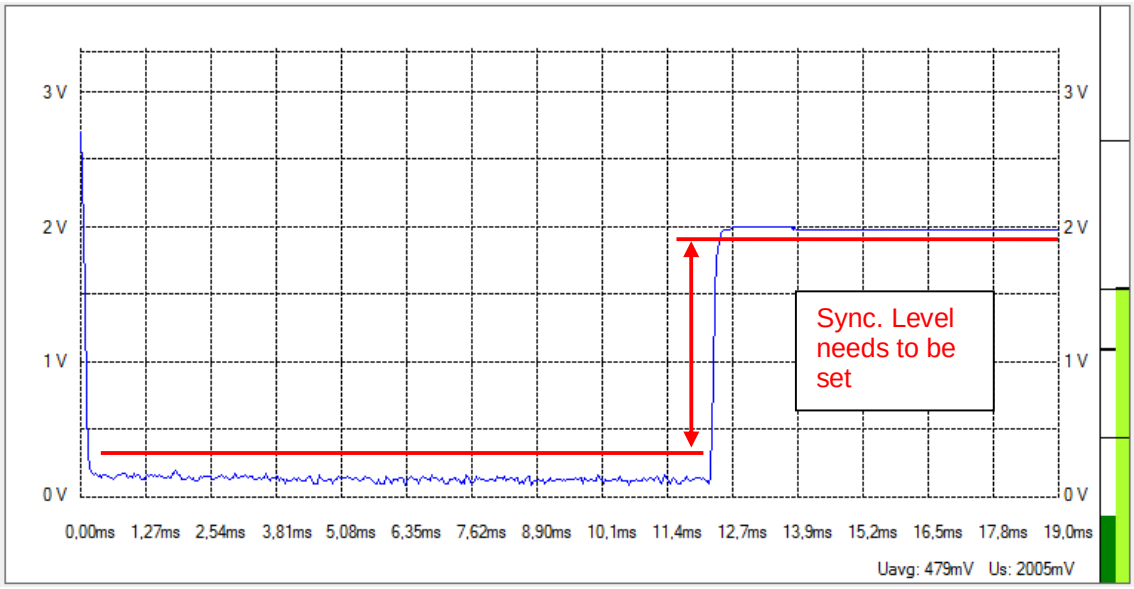
During the HDX listening period, the ABR200 is able to evaluate the so called RSSI level. RSSI means: **R**eceived **S**ignal **S**trength **I**ndication. You might already know this term from other radio technologies like Wi-Fi. If another reader is activating its RF-field during the HDX listening period of the reader we are currently looking at, the ABR200 will take this 'rising edge' in the RSSI as the reason also to activate its own RF-field immediately.

Although the integrated diagnosis function was not explained in detail in this manual, we will have a look at some RSSI samples. If necessary, please refer to the *"Agrident_Integrated_Diagnosis_Function_Manual_eng"* first.



In a “noise-free” environment, the RSSI should be 500mV or lower like in the screenshot above.

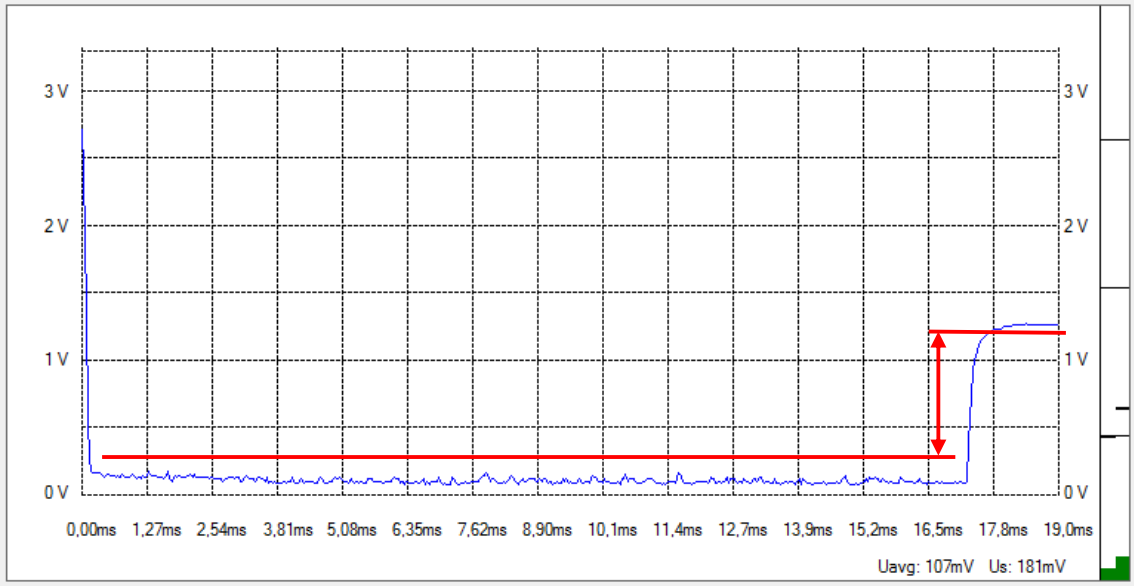
The following sample shows the rising edge in the RSSI, caused by another reader which just activated its field.



What the ABR200 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 500mV. You might also set it higher but then you decrease the sensitivity of Wireless Sync. A level of about 2 Volts or higher would make no sense at all since the ‘other’ reader does not exceed the 2 Volts in the ABR200s RSSI.

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 ABR200 will also synchronize to readers which are further apart. The Sync. Level is comparable with the “Trigger Level” of an oscilloscope.

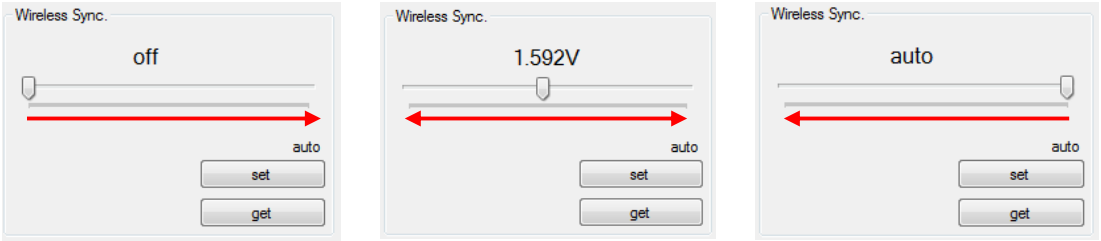
In the next example the ‘other’ reader seems to be further apart because the signal rise in the RSSI is smaller.



If you would select a Sync. Level of 1.3 Volts or even higher in this case, Wireless Sync. would never work because the signal, caused by the other reader, never reaches this level.

Fortunately the ABR200 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. For the automatic Sync. level detection the level is also continuously update, which is not possible if the level is chosen manually.

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”*.

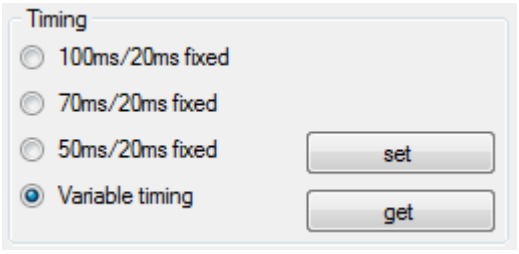
If the slide control is on the left side, *Wireless Sync.* is off. The slide control on the very right side means Sync. Level auto detection. All values in between are valid voltages for the Sync. level.

Wireless Sync. can only work with a fixed timing. The ABR200 can either use 50:20ms, 70:20ms or 100:20ms.

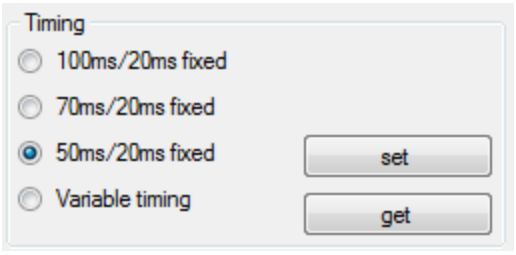
The Sync. timing is set via *Timing* in the *General* tab as well.

Since the *variable timing* is not allowed in case of using *Wireless Sync.*, the ABR200 will use a fixed timing of 50:20ms if *variable timing* is set in combination with *Wireless Sync.*.

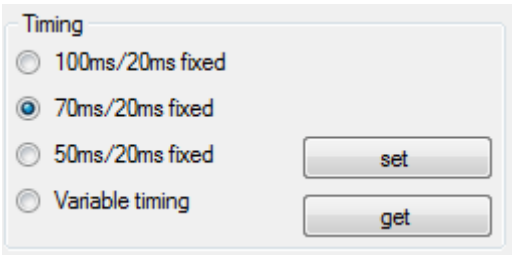
So if *Wireless Sync.* is activated, the settings in the *Timing* section work as follows:



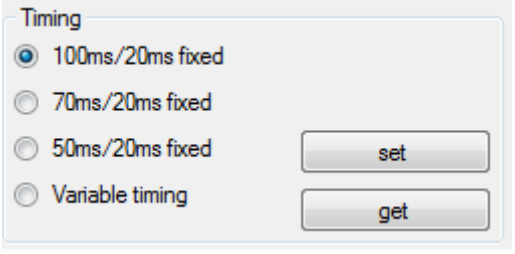
The ABR200 will use a fixed timing of 50ms field activation and 20ms field off.



The ABR200 will use a fixed timing of 50ms field activation and 20ms field off.



The ABR200 will use a fixed timing of 70ms field activation and 20ms field off. The exception is every 10th cycle, which is 50:20ms.



The ABR200 will use a fixed timing of 100ms field activation and 20ms field off. The exception is every 10th cycle, which is 50:20ms.

4 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 ABR200/EVK200 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 ABR200/EVK200 will render the warranty null and void.

5 Warranty

The manufacturer of the ABR200/EVK200 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.

6 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.

7 Trouble shooting

For any problem please contact us:

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