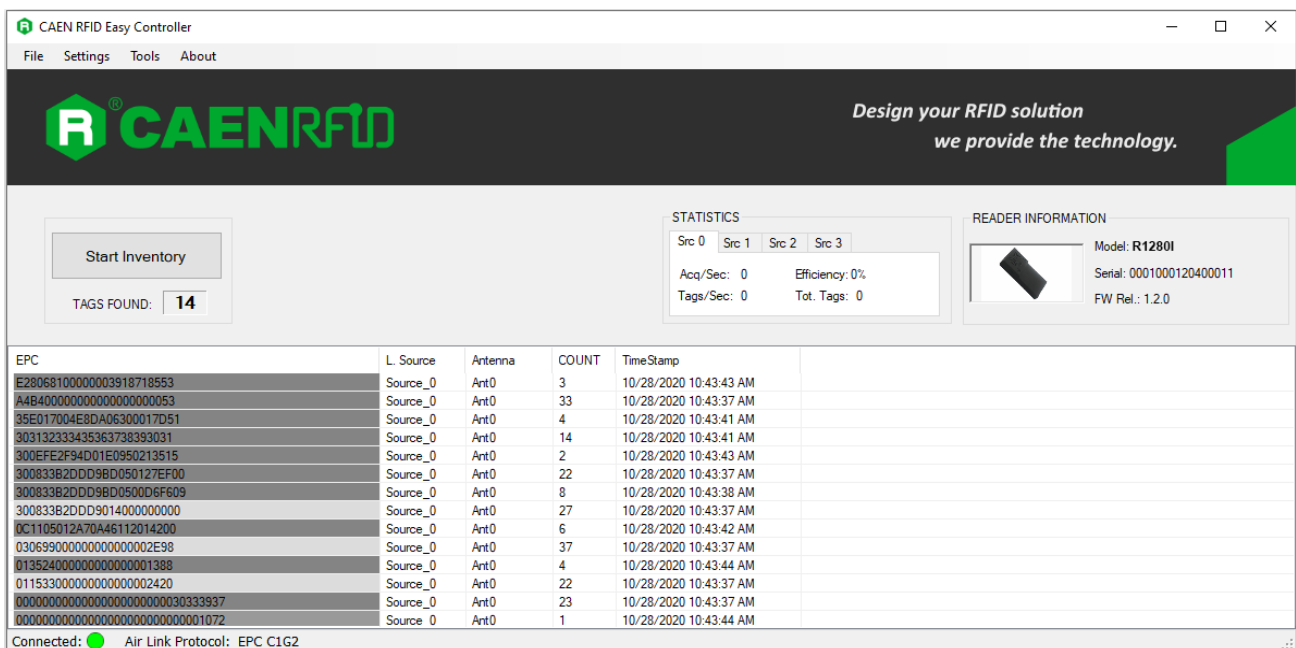


# TECHNICAL INFORMATION MANUAL

Revision 5 – 16 April 2021

# Easy Controller

## Software User Interface for CAEN RFID readers



The screenshot shows the CAEN RFID Easy Controller software interface. At the top, there is a menu bar with 'File', 'Settings', 'Tools', and 'About'. Below the menu bar is a header area with the CAENRFID logo and the slogan 'Design your RFID solution we provide the technology.'.

The main interface is divided into several sections:

- Start Inventory:** A button labeled 'Start Inventory' and a 'TAGS FOUND: 14' indicator.
- STATISTICS:** A section with tabs for 'Src 0', 'Src 1', 'Src 2', and 'Src 3'. It displays 'Acq/Sec: 0', 'Efficiency: 0%', 'Tags/Sec: 0', and 'Tot. Tags: 0'.
- READER INFORMATION:** A section showing a reader icon, 'Model: R12801', 'Serial: 0001000120400011', and 'FW Rel.: 1.2.0'.
- Table:** A table with columns for EPC, L. Source, Antenna, COUNT, and TimeStamp. It lists 14 rows of data.
- Bottom Status:** A bar showing 'Connected: ● Air Link Protocol: EPC C1G2'.

EPC	L. Source	Antenna	COUNT	TimeStamp
E2806810000003918718553	Source_0	Ant0	3	10/28/2020 10:43:43 AM
A4B4000000000000000000053	Source_0	Ant0	33	10/28/2020 10:43:37 AM
35E017004E8DA06300017D51	Source_0	Ant0	4	10/28/2020 10:43:41 AM
303132333435363738393031	Source_0	Ant0	14	10/28/2020 10:43:41 AM
300EFE2F94D01E0950213515	Source_0	Ant0	2	10/28/2020 10:43:43 AM
300833B2DD99D050127EF00	Source_0	Ant0	22	10/28/2020 10:43:37 AM
300833B2DD99D0500D6F609	Source_0	Ant0	8	10/28/2020 10:43:38 AM
300833B2DD99D05014000000000	Source_0	Ant0	27	10/28/2020 10:43:37 AM
0C1105012A70A46112014200	Source_0	Ant0	6	10/28/2020 10:43:42 AM
03069900000000000000002E98	Source_0	Ant0	37	10/28/2020 10:43:37 AM
01352400000000000000001388	Source_0	Ant0	4	10/28/2020 10:43:44 AM
01153300000000000000002420	Source_0	Ant0	22	10/28/2020 10:43:37 AM
00000000000000000000003033937	Source_0	Ant0	23	10/28/2020 10:43:37 AM
000000000000000000000001072	Source_0	Ant0	1	10/28/2020 10:43:44 AM

# Scope of Manual

This manual will help you to get started with the Easy Controller, the RFID Software User Interface for CAEN RFID Easy2read family. This Software allows you to control and configure all the CAEN RFID readers in a simple and easy way.

This manual refers to:

- Easy Controller for Windows version  $\geq 1.9.0$

# Change Document Record

Date	Revision	Changes	Pages
14 May 2012	01	First release.	-
		Added information about CAEN RFID Easy Controller Software Web Page	-
		Modified Fig. 4.1: General Options Window	-
		Modified Continuous mode in the Identification paragraph	-
13 Nov 2013	02	Modified Fig. 4.3: Reader Configuration Window	-
		Added sweep power mode description	-
		Modified Fig. 4.4: Logical Source Configuration Window	-
		Added Multiplexer Management Window paragraph	-
		Added Filtering Tags paragraph	-
		Added Disable list clearing command	-
12 Jan 2015	03	Modified Fig. 3.2: Listview header	-
		Modified Main Window paragraph	-
14 Sep 2015	04	Added Advanced Settings paragraph	-
		Modified Read & Write paragraph	-
16 Apr 2021	05	Graphic Restyling	All pages
		Modified <i>Installation</i> paragraph	7
		Added <i>Hardware Connection</i> chapter	10
		Modified <i>Quick Start</i> chapter	22
		Added information on e-seal mode in the <i>Logging options</i> paragraph	35
		Modified <i>Advanced Settings</i> paragraph	37
Modified <i>Kill</i> paragraph	32		

# Reference Document

[RD1] EPCglobal: EPC Radio-Frequency Identity Protocols Class-1 Generation-2 UHF RFID Protocol for Communications at 860 MHz – 960 MHz, Version 2.0.1 (April, 2015).

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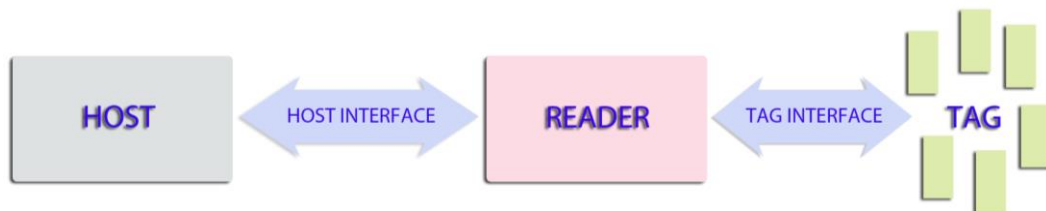
# 1 INTRODUCTION

---

## Before starting: CAEN RFID reader system overview

Before using this software it is useful to get introduced to the basic concepts of CAEN FID readers.

A CAEN RFID reader can be seen, in a simplified model, as a box with one or more communication interfaces to the host side and one or more communication interfaces to the tag side. The reader receives commands coming from the host (a PC or any other controlling device) and it uses the interface to the tag (typically one or more antennas) to perform operations on tag itself and then it replies back to the host.



Antennas belonging to the same reader can be grouped in logical groups called “logical sources” or simply “sources”.

CAEN RFID protocol defines up to 4 logical sources, named from “Source\_0” to “Source\_3”.

A source is composed by the 2 elements specified below:

- *Antennas:*

CAEN RFID readers can have from 1 to 4 antenna ports according to the model. In case of one antenna reader the only available antenna is linked to “Source\_0”. In case of four antennas reader, the default configuration consists of a single antenna connected to a single source. Therefore “Source\_0” identifies the first antenna... “Source\_3” identifies the fourth antenna. Each antenna can be linked to the source in a non-exclusive mode: for example the first antenna can be linked to “Source\_0” and “Source\_3”.

- *A set of standard EPC Class1 Gen2 parameters:*

Q value, Session, Selected, and Target (for more info please refer to the EPC Class 1 Gen 2 specification document [RD1]).

Remember that all operations on the tags are performed through these logical sources.

## Installation

CAEN RFID Easy Controller installation is provided through an auto-installer file called *Setup.exe*: running this, Easy Controller will install on pc.

Before running, be sure that your pc meets the minimum system requirements:

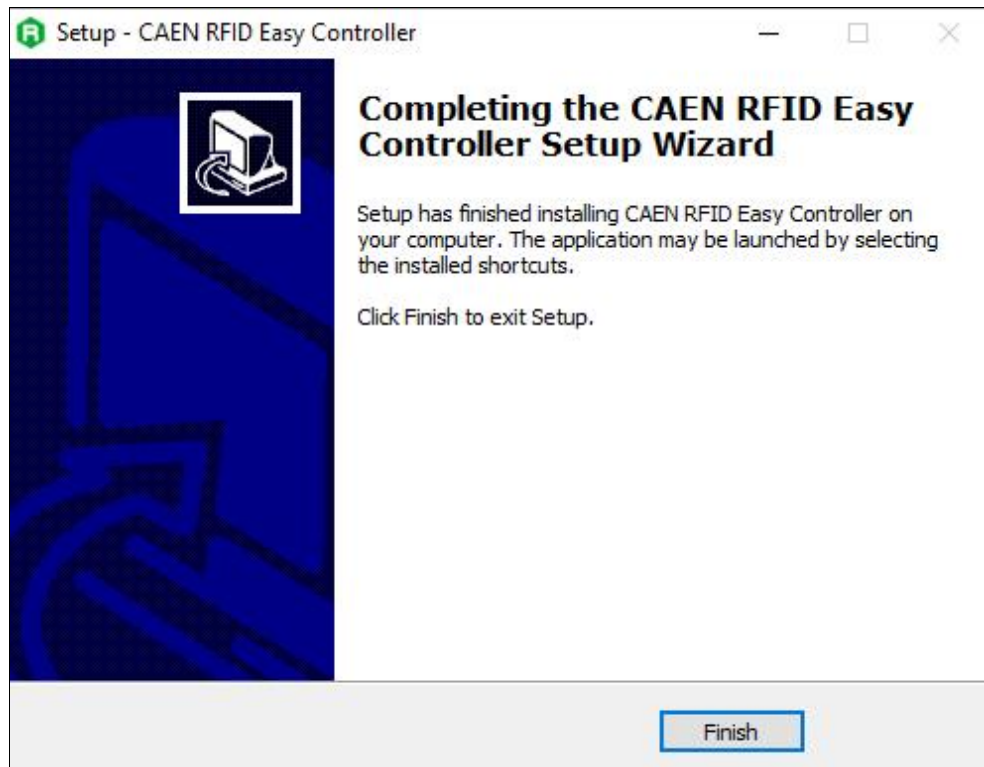
- 1,1 gigahertz (GHz) or faster processor
- 2 gigabyte (GB) RAM
- 30 MB available hard disk space for installation (administration rights required)
- Microsoft .NET 4.5.1 runtime or higher
- Microsoft Windows 7/8/10

To install the software:

1. Download the [CAEN RFID Easy Controller Software](#) from our web site (*support* → *software & firmware* section).
2. Double click on the *Setup.exe* file, click on next:



3. Follow the instructions and then click on *Finish*:





If you choose *default value* during setup, the files of the EasyController will be placed under *Program files* in a folder named *CAEN RFID Easy Controller*.

This folder contains:

Directory/file name	Description
Base	This directory contains information on all supported readers and on general options.
BaseUtils.dll	This library helps the Easy Controller to parse and save information stored in Base folder.
CAENRFIDLibrary.dll	This is the CAEN RFID .NET library used by the Easy Controller to work with reader.  <b>Note:</b> if you want to develop your own .NET application use the appropriate link to our site to download the latest version of the .NET library.
Unins000.dat	This file is used by the uninstaller.
Unins000.exe	This is the uninstaller: if you want to uninstall the Easy Controller please refer to <i>Uninstalling CAEN RFID Easy Controller</i> paragraph, page 9.
Easy Controller src	This folder contains Visual Studio professional projects of the Easy controller with its source code.

**Tab. 1.1: CAEN RFID Easy Controller Directories**

## Uninstalling CAEN RFID Easy Controller

To uninstall CAEN RFID Easy Controller:

Click on *Start* → *All Programs* → *CAEN RFID Easy Controller* → *Uninstall CAEN RFID Easy Controller*.

## 2 HARDWARE CONNECTION

### Introduction

A CAEN RFID reader connected to a Windows PC can be controlled using the Easy Controller Software for Windows, as illustrated in this manual.

The connection of the reader to the Windows PC can be done via:

- Bluetooth
- USB
- Ethernet

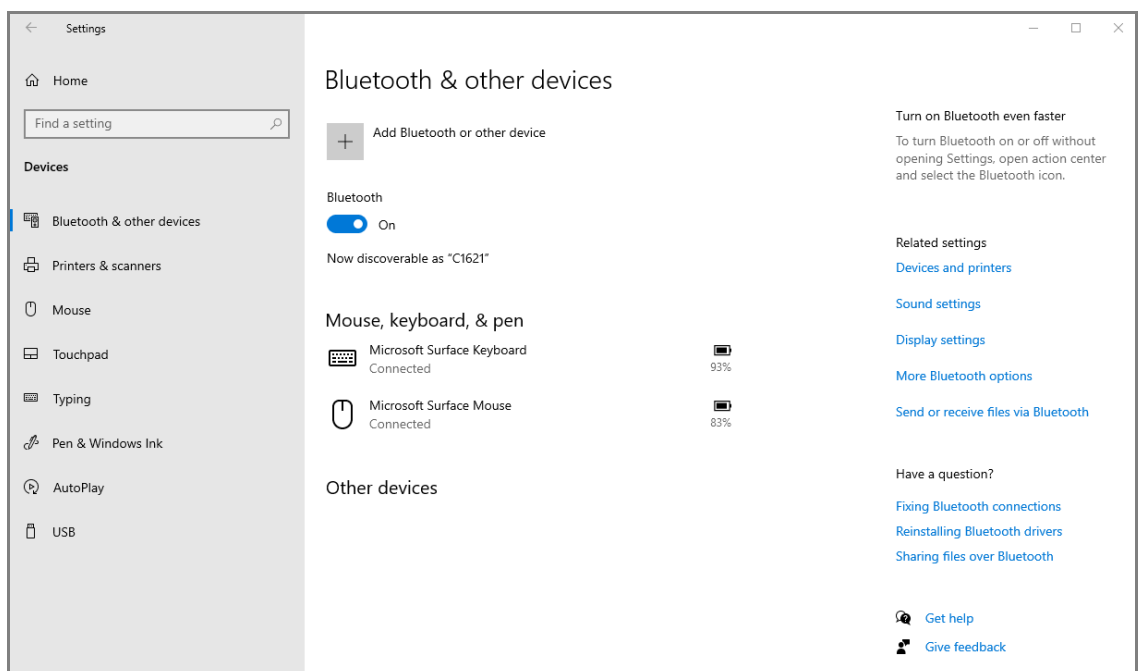
Depending on the reader's model, one or more of the options described above may be supported (for detail refer to your reader's technical information manual).

For readers that support the activation of different usage profiles, management via the Easy Controller Software takes place **only** with EASY2READ profile active (for detail refer to your reader's technical information manual).

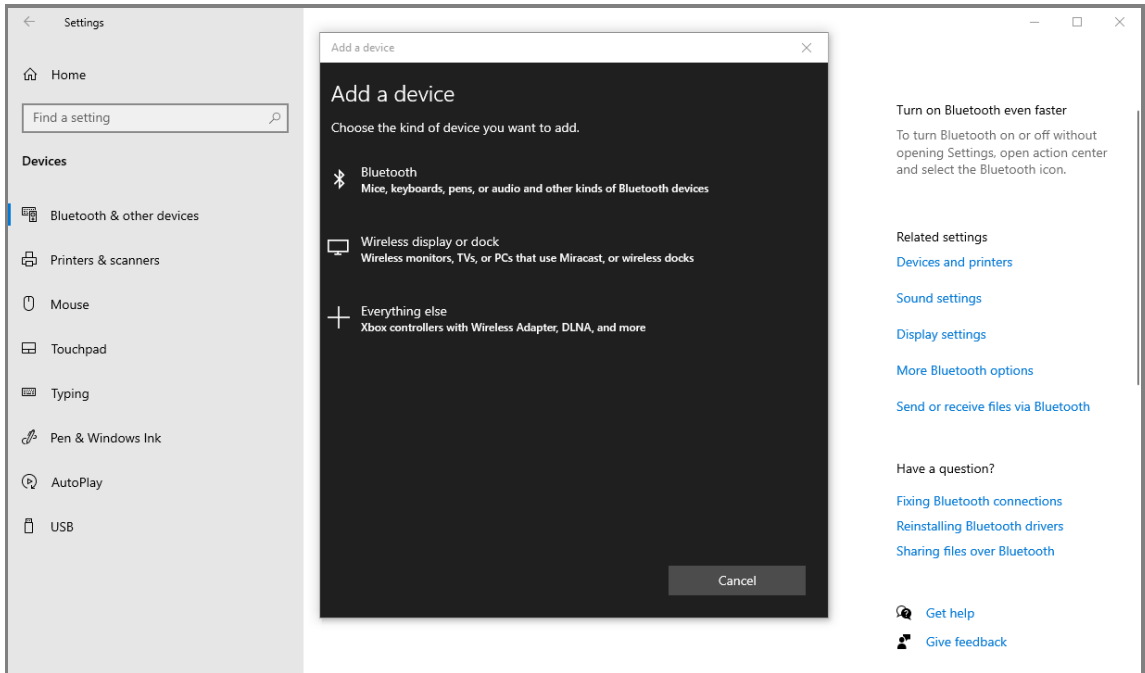
### Bluetooth Communication Setup

If supported by the reader, follow the steps below to connect your Windows PC to the CAEN RFID reader using the BT connection and the Easy Controller Software. All the images below were generated using the Windows 10 Operating System.

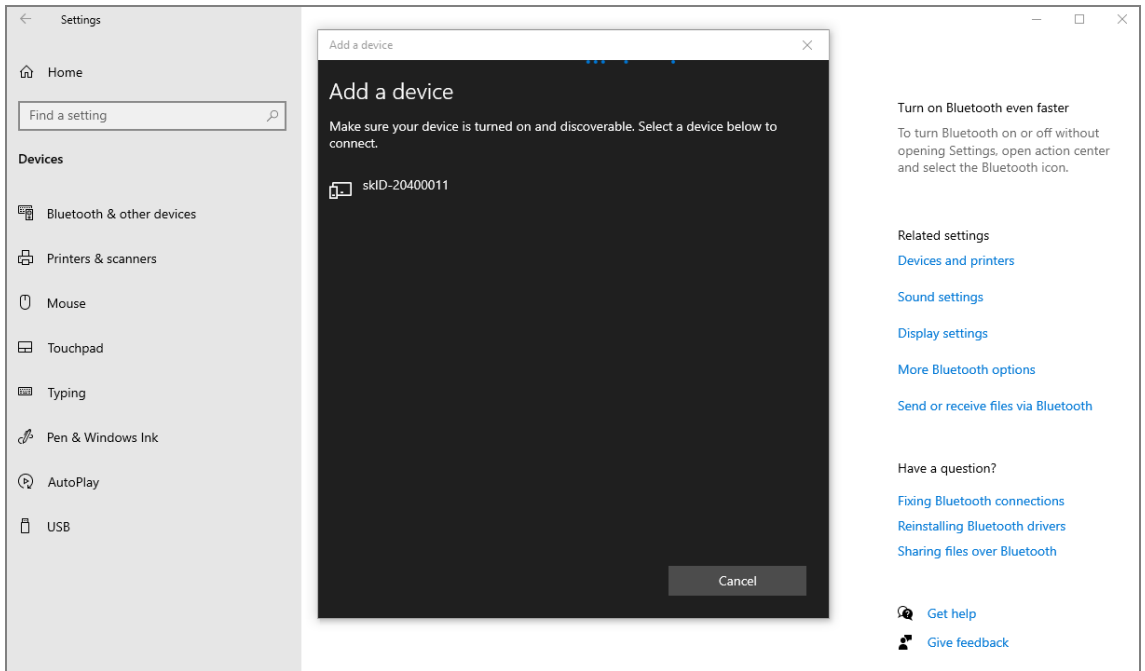
1. Follow the instructions given in your reader's technical information manual to select the *Bluetooth communication interface* for the reader.
2. In your Windows PC go to *Settings* → *Devices*.
3. Click on *Bluetooth & other devices* → *Add Bluetooth or other device*:



4. Click on *Bluetooth*:

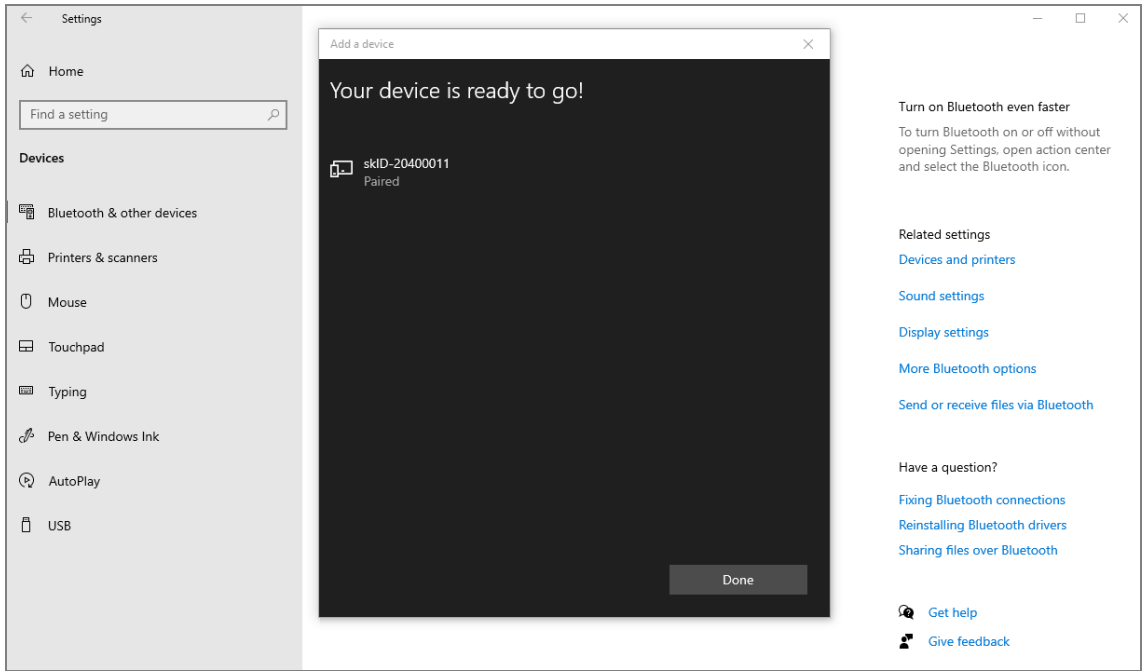


5. Select the CAEN RFID reader (in this example the skID R1280I reader with serial number 20400011):



6. The message on the screen "Your device is ready to go!" informs you that the connection is established.

If supported by the reader, the Bluetooth blue LED of the reader turns on.



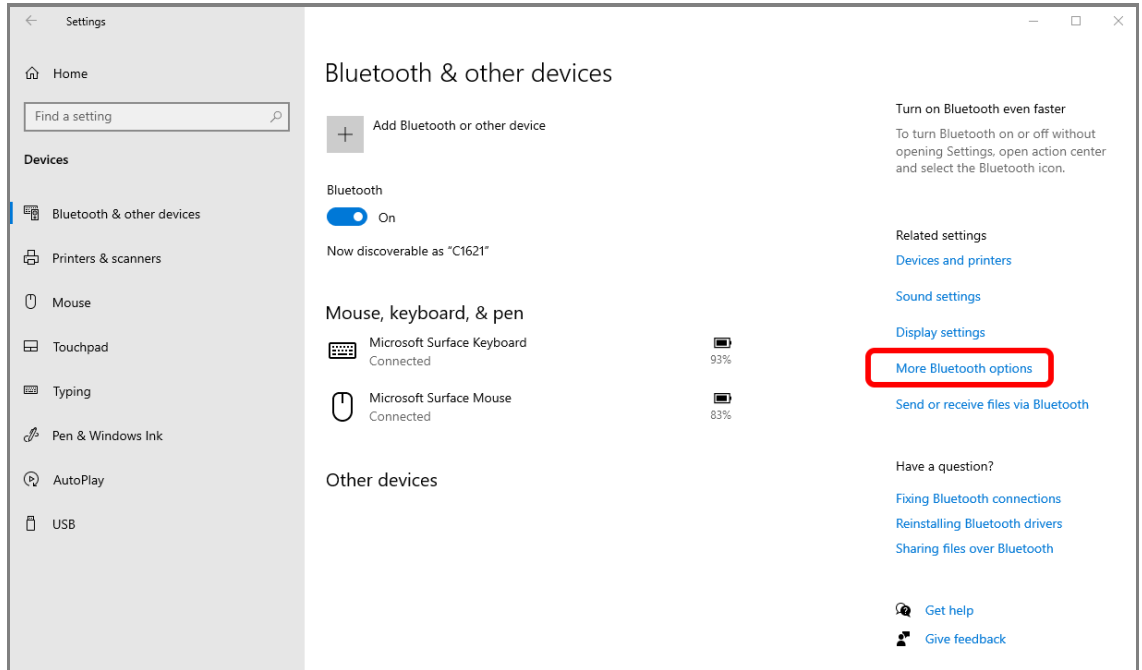
## Easy Controller via Bluetooth connection

Once the Bluetooth connection is established, a virtual COM port is created on the host PC.

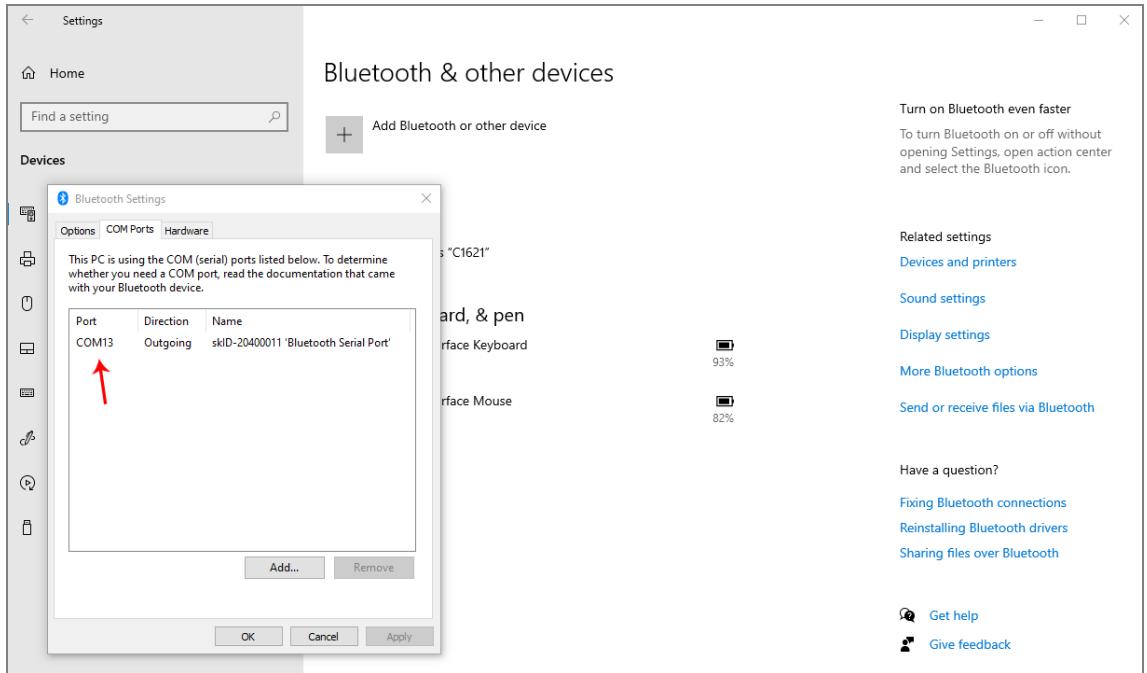
This COM port is used to connect to the reader with the CAEN RFID Easy Controller application.

Follow the steps below to connect the reader using the Easy Controller for Windows via Bluetooth:

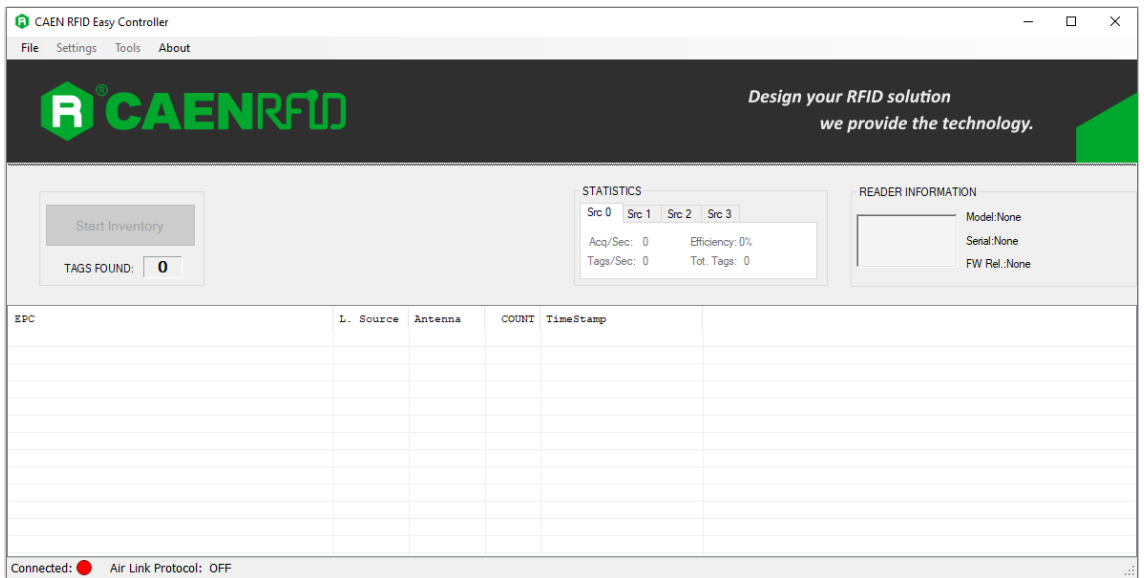
1. Connect the reader to your PC using the Bluetooth connection as explained in previous paragraph.
2. Download from the CAEN RFID web site the latest version of the CAEN RFID [Easy Controller for Windows](#) software and install it (see § *Installation* page 7).
3. In your Windows Pc go to *Settings* → *Devices*. Click on *Bluetooth & other devices* → *More Bluetooth option*:



- Look for the COM port in the *Bluetooth Settings* (COM 13 in the example below):

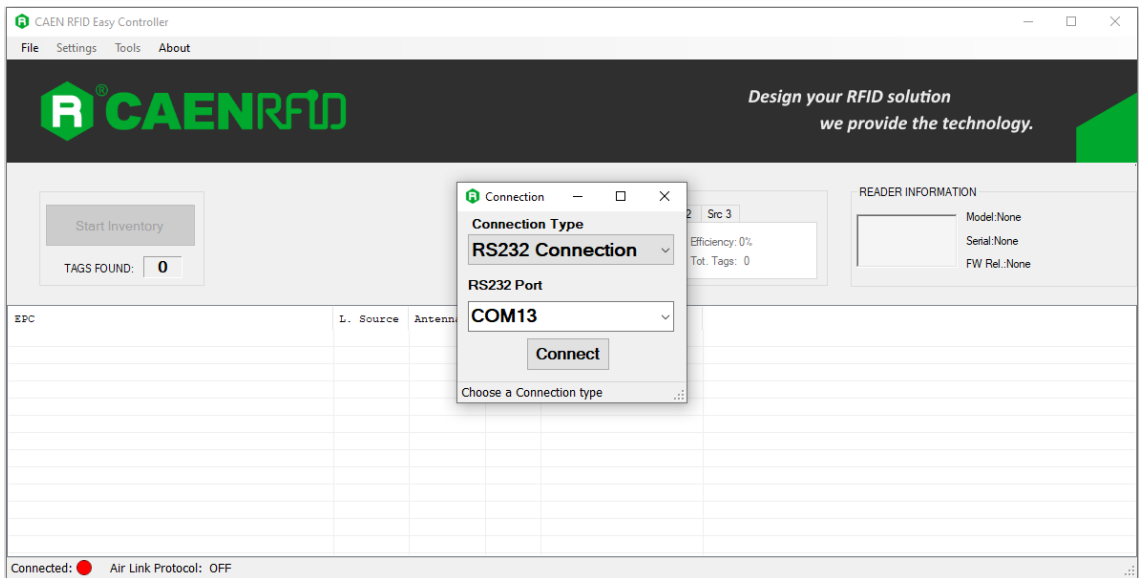


- Launch the CAEN RFID Easy Controller application:

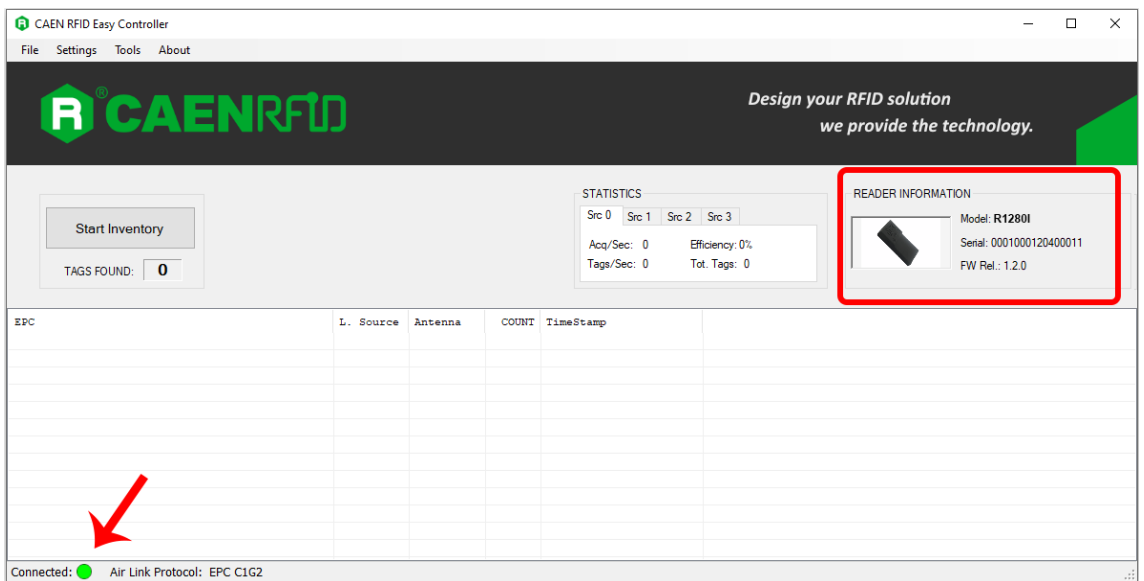


- On the main application window click on *File* → *Connect*; the connection dialog box will appear.

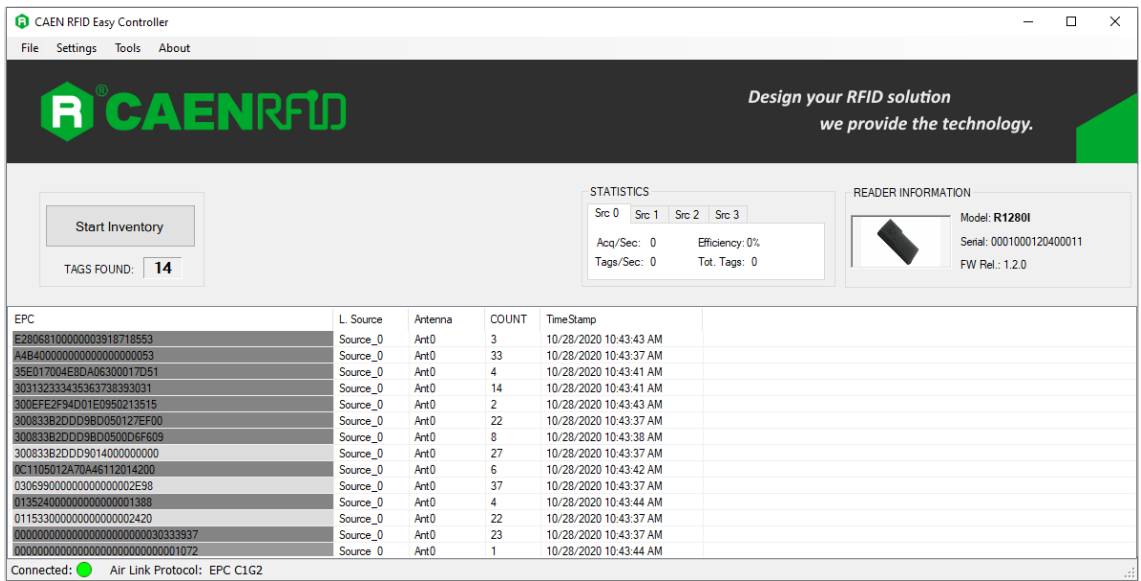
- Select *RS232* from the *Connection Type* combo box and the right COM port number from the *RS232 Port* combo box (COM13 in this example):



- Click on *Connect*.
- To verify if the connection with the reader has been established, check the green dot on the bottom left side of the sidebar. Into the *READER INFORMATION* box you can find information on reader model, serial number and firmware release:



- Place tags in front of the reader and click on *Start Inventory* to see the tag information displayed on the main window:



The screenshot shows the CAEN RFID Easy Controller software interface. The main window displays the CAENRFID logo and the slogan "Design your RFID solution we provide the technology." Below this, there is a "Start Inventory" button and a "TAGS FOUND: 14" indicator. To the right, there are "STATISTICS" and "READER INFORMATION" panels. The "STATISTICS" panel shows "Src 0", "Src 1", "Src 2", and "Src 3" with "Acq/Sec: 0", "Efficiency: 0%", "Tags/Sec: 0", and "Tot. Tags: 0". The "READER INFORMATION" panel shows a reader icon, "Model: R12801", "Serial: 0001000120400011", and "FW Rel.: 1.2.0".

EPC	L. Source	Antenna	COUNT	TimeStamp
E28068100000003918718553	Source_0	Ant0	3	10/28/2020 10:43:43 AM
A4B400000000000000000053	Source_0	Ant0	33	10/28/2020 10:43:37 AM
35E017004E9DA06300017D51	Source_0	Ant0	4	10/28/2020 10:43:41 AM
303132333435363738393031	Source_0	Ant0	14	10/28/2020 10:43:41 AM
300EFE2F84D01E0950213515	Source_0	Ant0	2	10/28/2020 10:43:43 AM
300833B2DD98D050127EF00	Source_0	Ant0	22	10/28/2020 10:43:37 AM
300833B2DD98D0500D6F609	Source_0	Ant0	8	10/28/2020 10:43:38 AM
300833B2DD98D0501400000000	Source_0	Ant0	27	10/28/2020 10:43:37 AM
0C1106012A70A46112014200	Source_0	Ant0	6	10/28/2020 10:43:42 AM
0305990000000000000002E38	Source_0	Ant0	37	10/28/2020 10:43:37 AM
0135240000000000000001388	Source_0	Ant0	4	10/28/2020 10:43:44 AM
0115330000000000000002420	Source_0	Ant0	22	10/28/2020 10:43:37 AM
00000000000000000000030333937	Source_0	Ant0	23	10/28/2020 10:43:37 AM
000000000000000000000001072	Source_0	Ant0	1	10/28/2020 10:43:44 AM

Connected: ● Air Link Protocol: EPC C1G2

You can disconnect the reader by clicking on *File* → *Disconnect*.



## USB Communication Setup

If supported by the reader, the reader can be connected to a PC using the USB cable and it is detected by the PC as an emulated serial port.

Follow the steps below to connect your Windows PC to the CAEN RFID reader using the USB connection and the Easy Controller Software. All the images below were generated using the Windows 10 Operating System.

1. Follow the instructions given in your reader's technical information manual to select the USB communication interface for the reader.
2. Connect the CAEN RFID reader to the PC using the USB cable and then power ON the reader.
3. The USB interface creates virtual COM port on the host PC that can be used to connect to the reader with the CAEN RFID Easy Controller application.

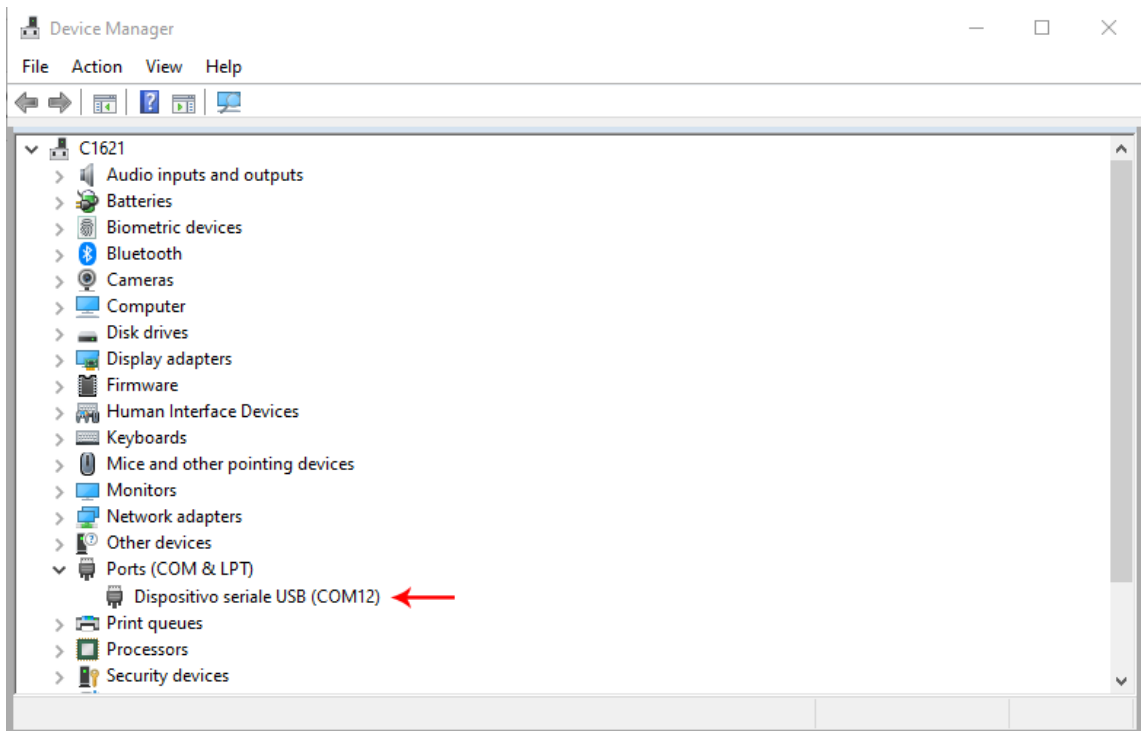
## Easy Controller via USB connection

Once the USB connection is established, a virtual COM port is created on the host PC.

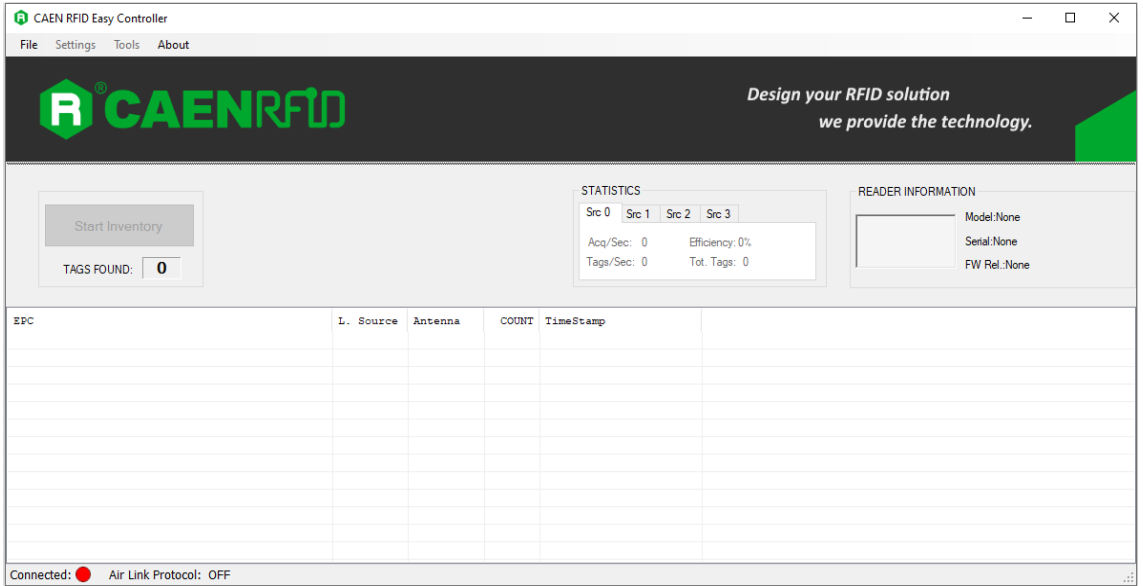
This COM port is used to connect to the reader with the CAEN RFID Easy Controller Software.

Follow the steps below to connect the reader using the Easy Controller for Windows via USB:

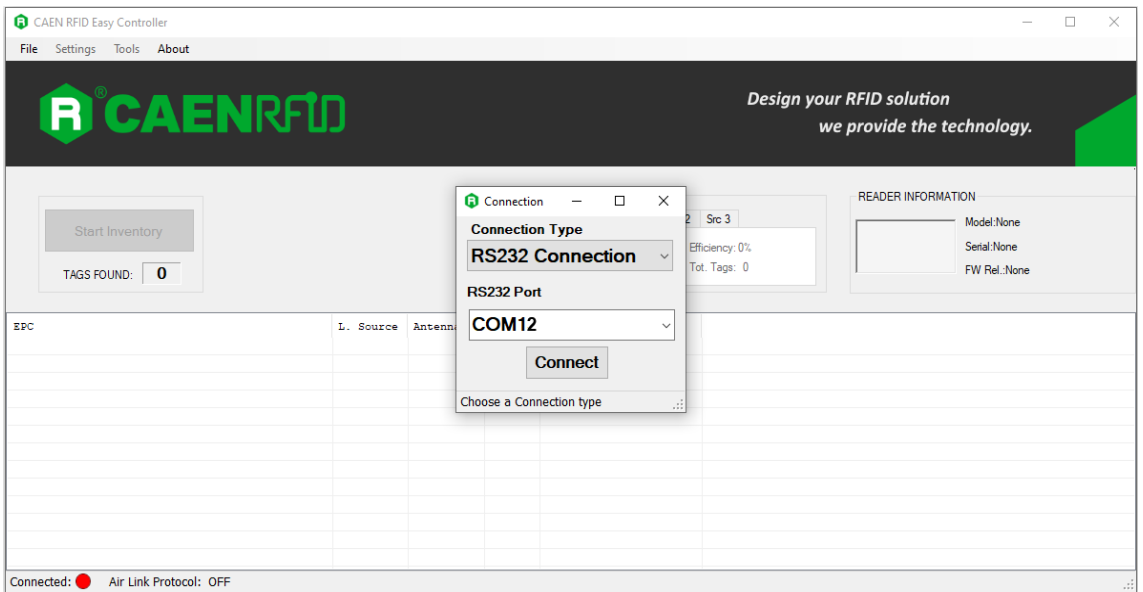
1. Download from the CAEN RFID web site the latest version of the CAEN RFID [Easy Controller for Windows](#) software and install it.
2. In your Windows Pc go to *Settings* → *System*. Open the *System properties* and click on *Device Manager*.
3. Look for the COM port in the *Device Manager* window (COM 12 in the example below):



4. Launch the CAEN RFID Easy Controller application:

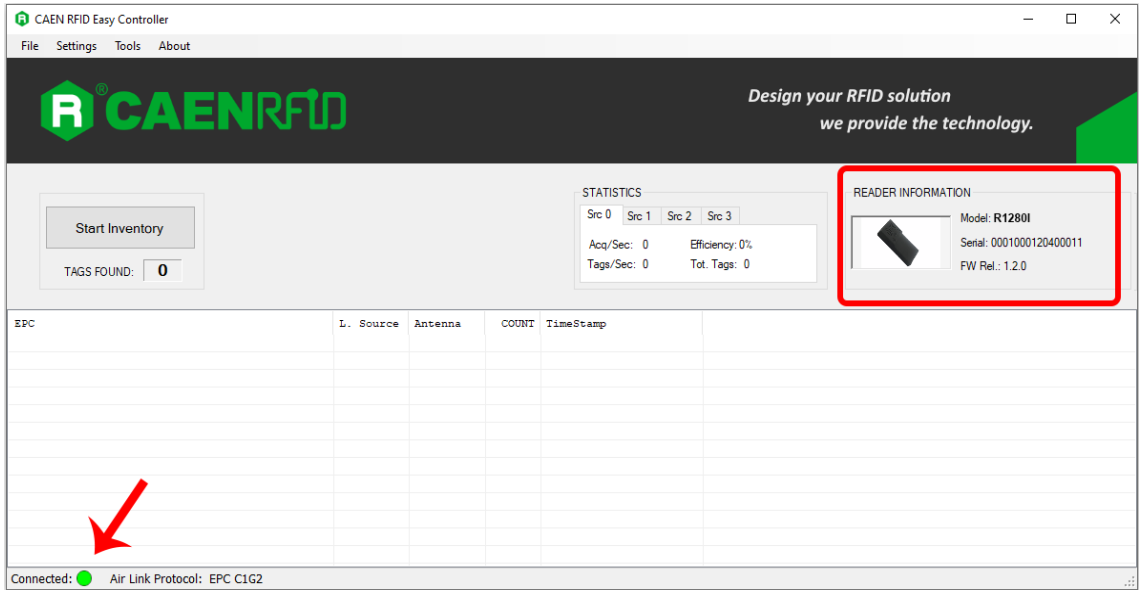


5. On the main application window click on *File* → *Connect*; the connection dialog box will appear.
6. Select *RS232* from the *Connection Type* combo box and the right *COM* port number from the *RS232 Port* combo box (COM12 in this example):

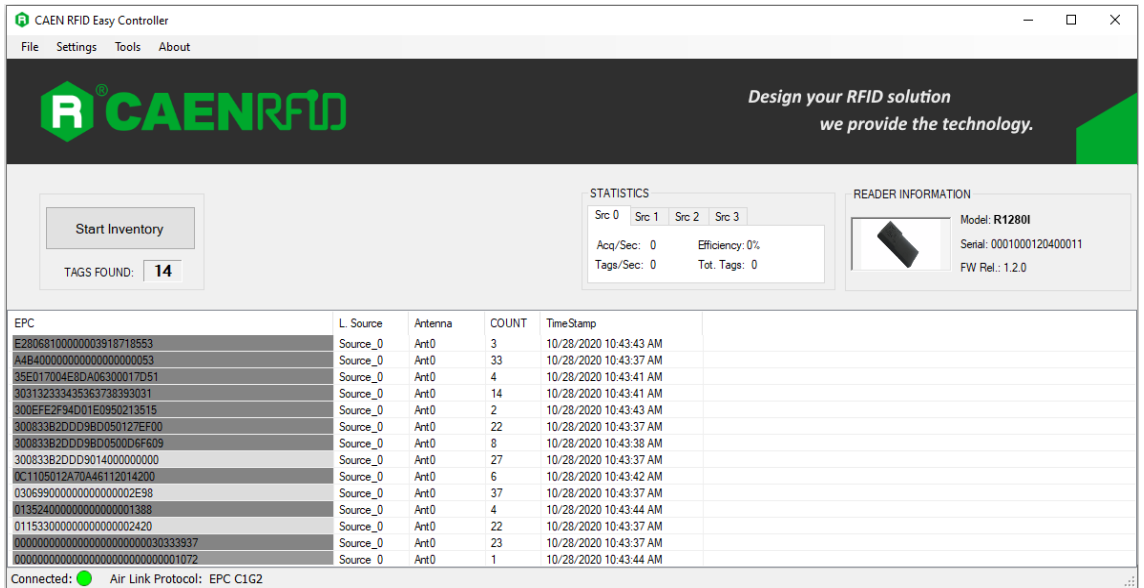


7. Click on *Connect*.

- To verify if the connection with the reader has been established, check the green dot on the bottom left side of the sidebar. Into the *READER INFORMATION* box you can find information on reader model, serial number and firmware release:



- Place tags in front of the reader and click on *Start Inventory* to see the tag information displayed on the main window:



You can disconnect the reader by clicking on *File → Disconnect*.

## Ethernet Communication Setup

If supported by the reader, the reader can be connected to a Windows PC using an Ethernet cable.

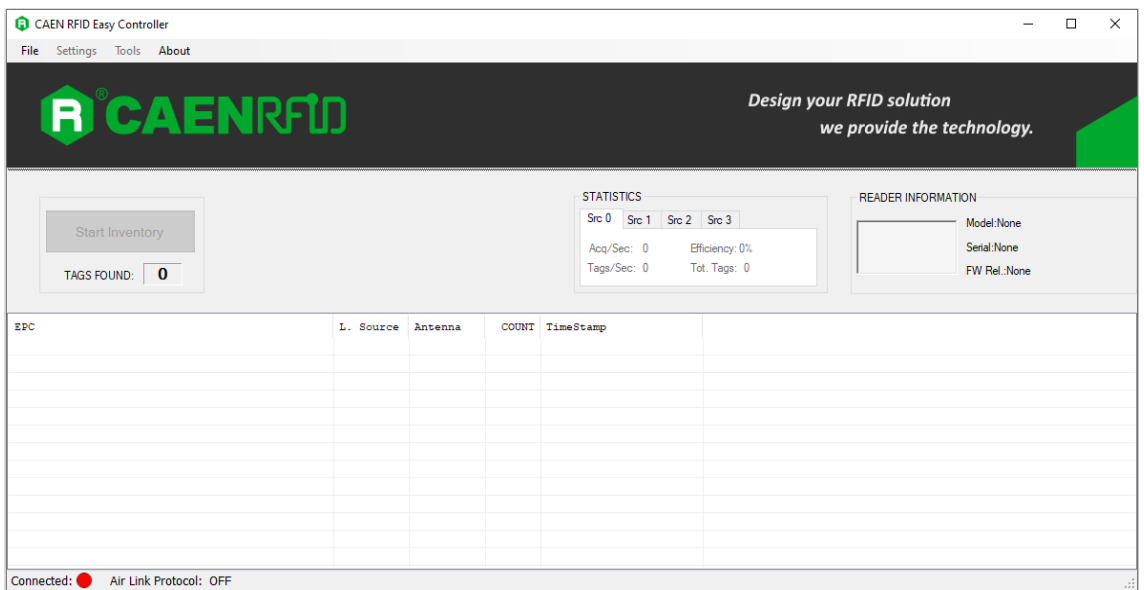
Follow the instructions given in your reader's technical information manual to select the *Ethernet communication interface* for the reader and set the network configuration.

Now you can use the [CAEN RFID Easy Software](#) to control the reader.

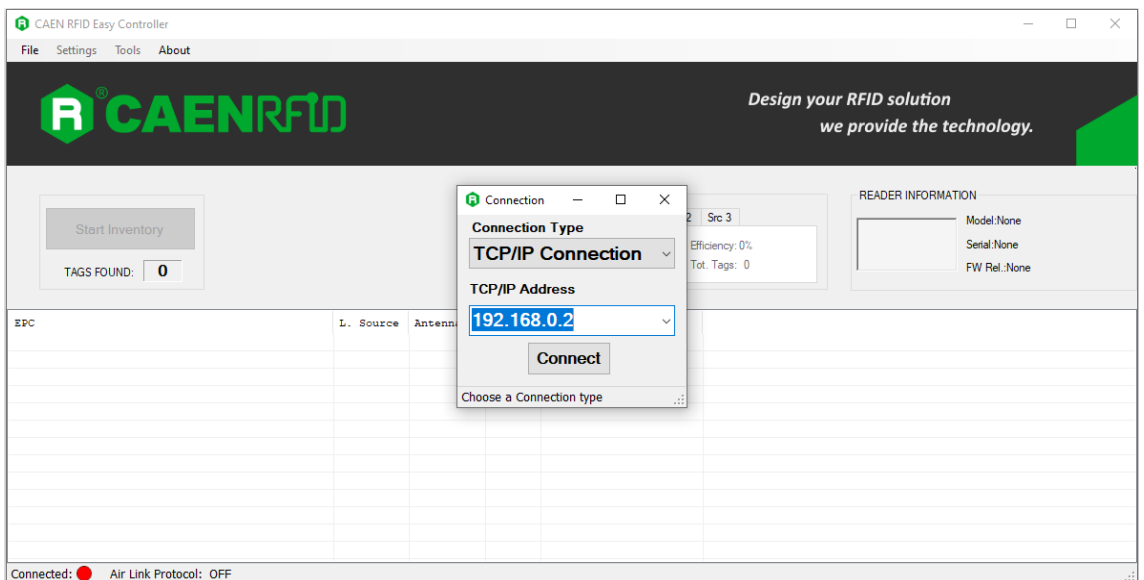
### Easy Controller via Ethernet connection

Follow the steps below to connect the reader using the Easy Controller for Windows via Ethernet:

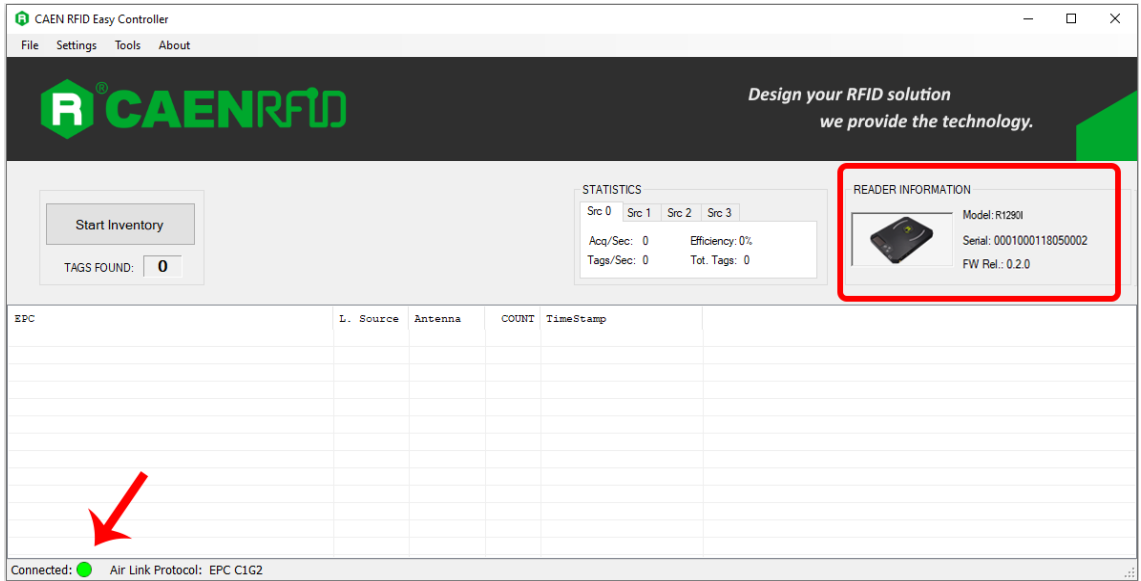
1. Download from the CAEN RFID web site the latest version of the CAEN RFID [Easy Controller for Windows software and install it.](#)
2. Launch the *Easy Controller* application:



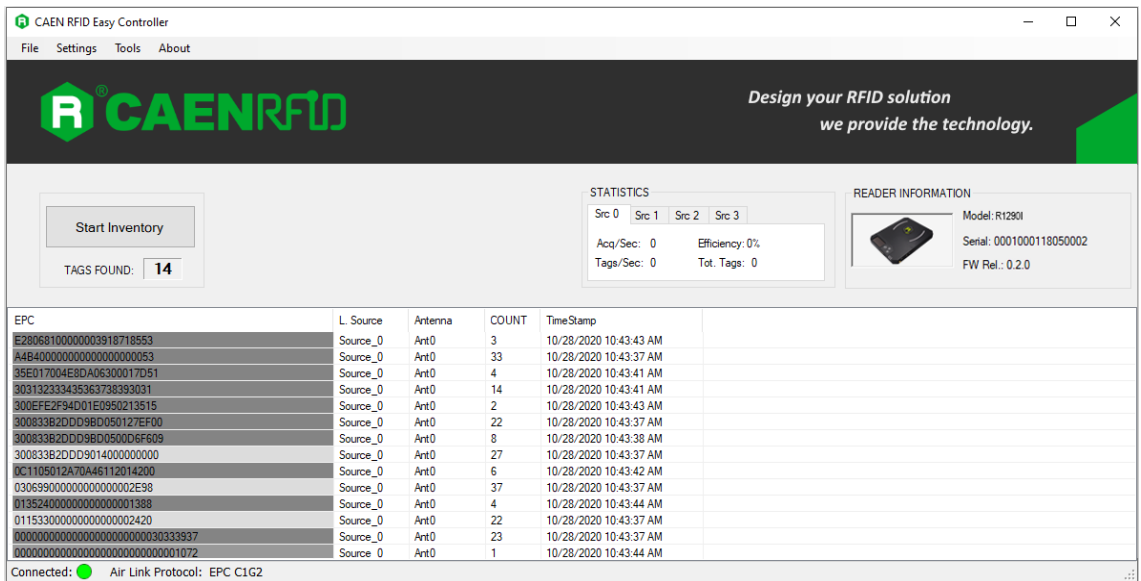
3. On the main screen click on *File* → *Connect*. A Connection windows will open. Select the *Connection Type* (TCP/IP Connection) and type the reader IP address into the *TCP/IP Address* box (in this example 192.168.0.2). Then click on *Connect*:



- To verify if the connection with the reader has been established, check the green dot on the bottom left side of the sidebar. Into the *READER INFORMATION* box you can find information on reader model, serial number and firmware release (in this example, Mod. R1290I Hex):



- Place a tag on the reader, click on *start inventory* and see the tag information displayed on the main window:



You can disconnect the reader by clicking on *File → Disconnect*.

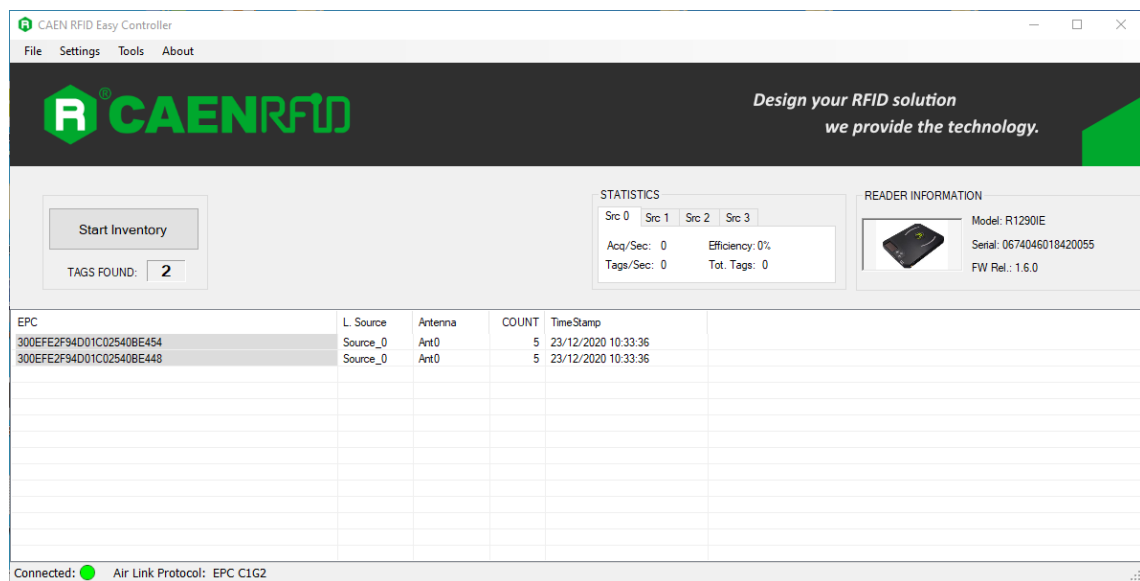
# 3 QUICK START

## Main window

Once connected to the reader, on the *READER INFORMATION* box you can find information on reader model, serial number and firmware release.

On the menu bar you can find four options:

- **File:** contains the *Connect, Disconnect, Enable Logging* and *Exit* choices
- **Settings:** contains the *Source Selection* and *Options* choices
- **Tools:** contains the *I/O management (GPIO)* choice
- **About:** opens the information dialog showing the Easy Controller Version



**Fig. 3.1: CAEN RFID Easy Controller Side Bar**

The *Start Inventory* button starts and stops the inventory process and shows the information retrieved from the tags in the main window. In the *TAGS FOUND* text box the number of detected tags is shown.

After the inventory has started, on the lower half of the main window you can find a table containing the following parameters:

- **EPC:** EPC code of the inventoried tag (tag ID)
- **L. Source:** source of identification
- **Antenna:** Antenna of the source that has identified the tag
- **TID:** TID of tag, if available (default is TID reading off)
- **RSSI:** Received Signal Strength Indicator (as 16 bit signed form)
- **COUNT:** number of time the tag has been read
- **TimeStamp:** timestamp associated with the time of first identification of tag

All the above listed parameters can be displayed or not in the table.

Using the context menu you can select the ones you want to be displayed in the table (right click with the mouse on the table and check/uncheck them).

Finally at the bottom of the main window you can find a status bar displaying the connection status (green dot = connected, red dot = not connected) and the anti-collision algorithm (air protocol) in use.

During the inventory cycle you can check the following parameters inside the *Statistic* box:

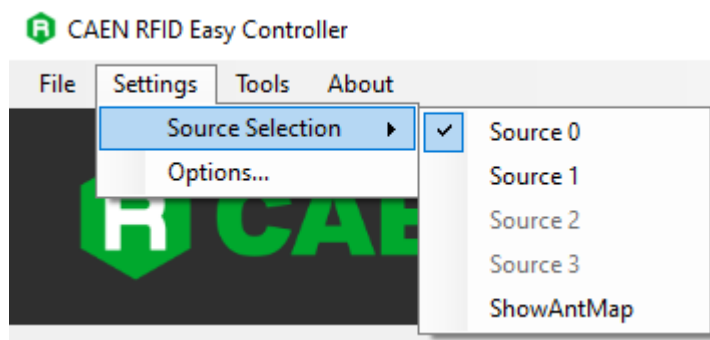
- **Acquisitions per second (Acq/sec):** the number of acquisition cycles per second
- **Tags per second (tags/sec):** the number of tags detected per second
- **Efficiency (Efficiency):** is the value calculated by a Simple Moving Average algorithm using *Acq/sec* and *tags/sec* parameters
- **Tot tags (Tags found):** maximum number of tags detected for each inventory cycle.

## Doing inventory

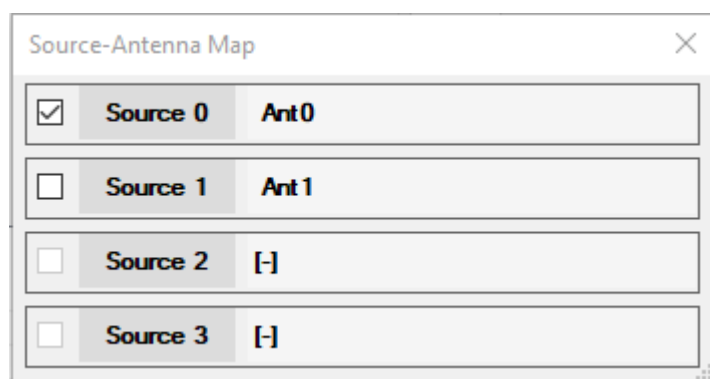
To start an inventory, click on *Start inventory* button.

By default the reader identifies tags using Source 0 (for further information on sources see § *Before starting: CAEN RFID reader system overview* page 6).

If you want to add sources click on *Settings* → *Source selection* and check the desired sources:



*ShowAntMap* option helps the user to get a quick view of the current attached antenna for each source:



Remember that if the reader has one antenna, only Source 0 is available.

To stop the inventory click on *Stop Inventory*. If *Enable Logging* has been previously selected, then the inventory results are automatically logged. For logging options, see *Logging options* section.

Once click on the *Start Inventory* button, the statistics are tabbed for source and updated values are shown only after about 30 total acquisitions.

*Note:* the efficiency and the acquisition speed depend on several factors (antenna type, testing environment and parameters settings) and do not represent a reliable index for an exhaustive evaluation of the reader performance.

To disable the clearing of the tags from the listview of the main window in each "Start Inventory", click right on the listview header and tick the menu item "clear list" (see § *Fig. 3.2: Listview header* page 24).

## Filtering Tags

Click right on the listview header and access the "Filtering Options":

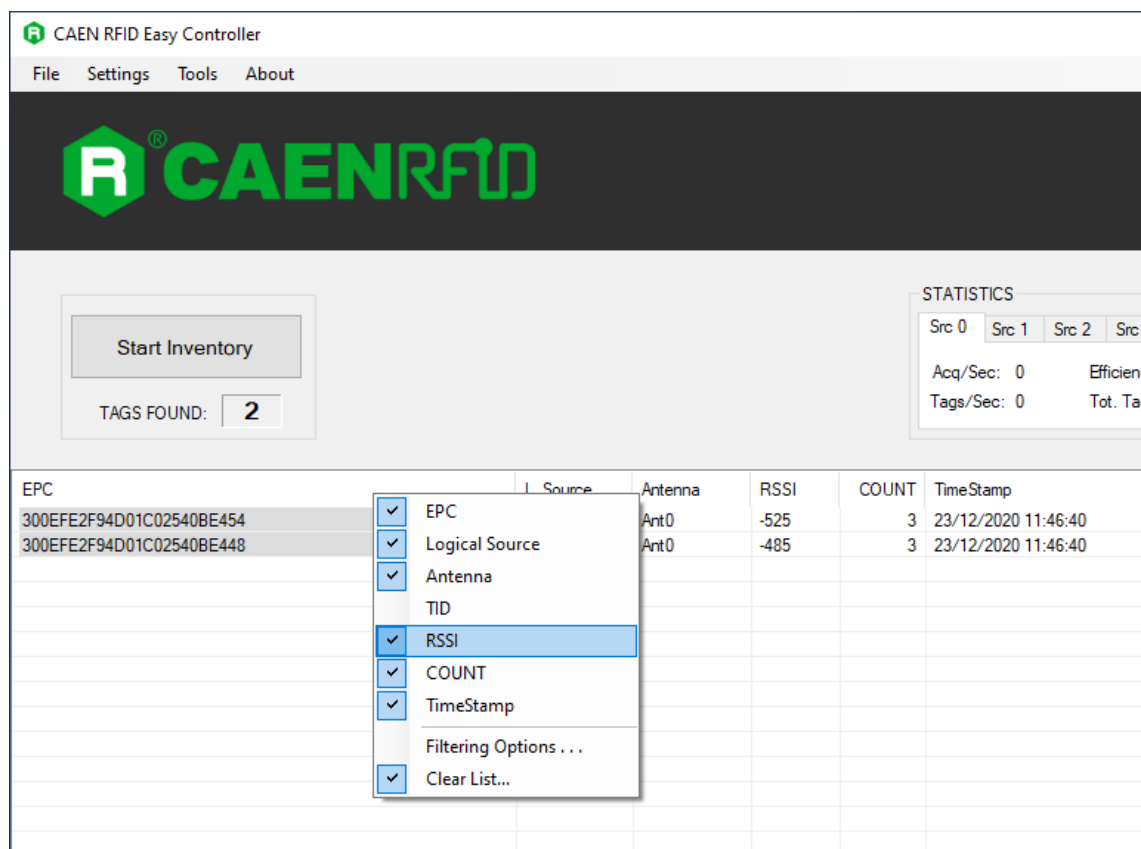


Fig. 3.2: Listview header

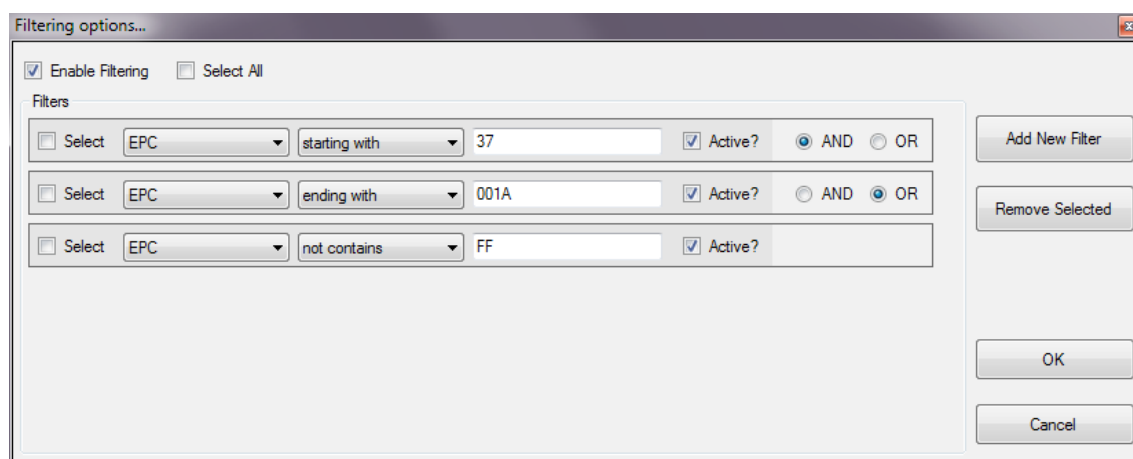


Fig. 3.3: Filtering options window

In the *Filtering Options* window, you can create filters for the inventory operations.

To enable the filtering system, check the "Enable Filtering" on the top.

The filters are concatenated into a unique condition linked by Boolean operators AND and OR.

To create a new filter, click on "Add New Filter" on the right and a new line will appear in the box.

**Filter parameters:**

- **Subject of the filter:**
  - **EPC:** to filter the EPC bank of a tag



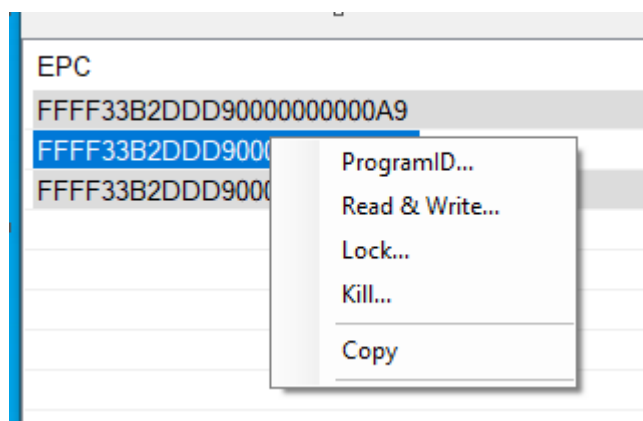
- **TID:** to filter the TID bank of a tag
- **RSSI:** to filter RSSI values of a tag
- **Condition of the filter:**
  - **starting with** (EPC and TID): the bank starts with a specific value
  - **ending with** (EPC and TID): the bank ends with a specific value
  - **contains** (EPC and TID): the bank contains a specific value
  - **not contains** (EPC and TID): the bank doesn't contain a specific value
  - **Greater than** (RSSI): the RSSI value is greater than a specific value
  - **Lesser than** (RSSI): the RSSI value is less than a specific value
  - **Equal to:** the RSSI value is equal to a specific value
- **Values:**
  - **EPC and TID:** hexadecimal string representing bytes (eg "3A5F")
  - **RSSI:** number of a valid RSSI (eg "-421 " or "-42.1 dBm")
- **Activate the filter:**
  - **Checked:** active filter
  - **Unchecked:** passive filter
- **Conjunction with the next filter (only for two or more filters):**
  - **AND:** binds the results of the current filter with the next one through the logical AND operator
  - **OR:** binds the results of the current filter with the next one through the logical OR operator

To remove a filter, select the filter (check "select all" in the top of the box to remove all the filters) and click on "Remove Selected".

To confirm the created filters, click on "OK", otherwise click on "Cancel".

## Operating with tags

After the inventory has been stopped, you can make some operations on tags that have been identified. Right click on the desired tag and the following context menu will appear:



The available operations on tags are:

- ProgramID
- Read and Write
- Lock
- Kill
- Copy

Copy option copies the EPC string in the Windows clipboard.

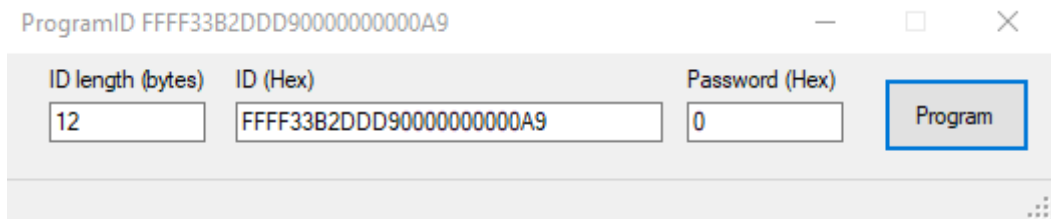
## ProgramID

ProgramID allows you to modify the EPC code of the selected tag. Usually EPC codes are 12 bytes length (96 bit).

In case the EPC bank has been previously locked you will need to input an access password.

The figure below shows the ProgramID window:

- **ID length** is the number of bytes of the new ID to program: 12 bytes is the standard length
- **ID** is an hexadecimal string that represents the new ID
- **Password** is a hexadecimal string that represents access password; it must be exactly 4 byte long



*Note:* EPC Class1 Gen2 defines two types of password: “kill password” and “access password” and both are 4 byte long. If a tag is locked, “access password” is used for all the operations but killing; kill operation must be performed using the “kill password”. The two passwords are stored in a reserved bank of tag.

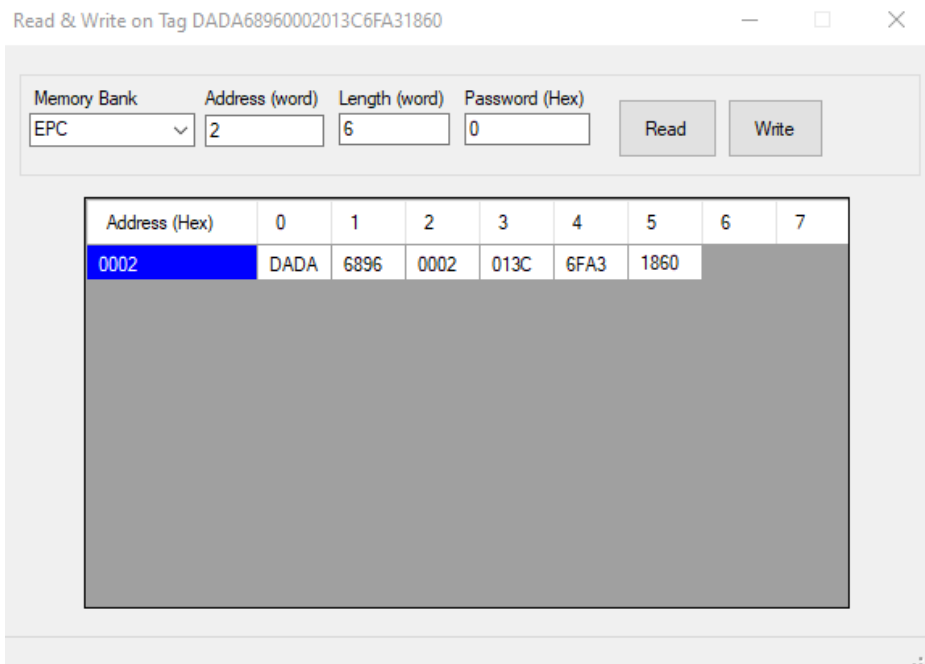
For tags memory map specification, please refer to *EPC Class 1 Gen 2 specification document* [RD1].

## Read & Write

You can quickly read and write information inside the tag using the *Read&Write* command.

The *Read&Write* window shows a part of the tag's memory in a mapped area.

An example of the mapped area:



You can set the read/write options:

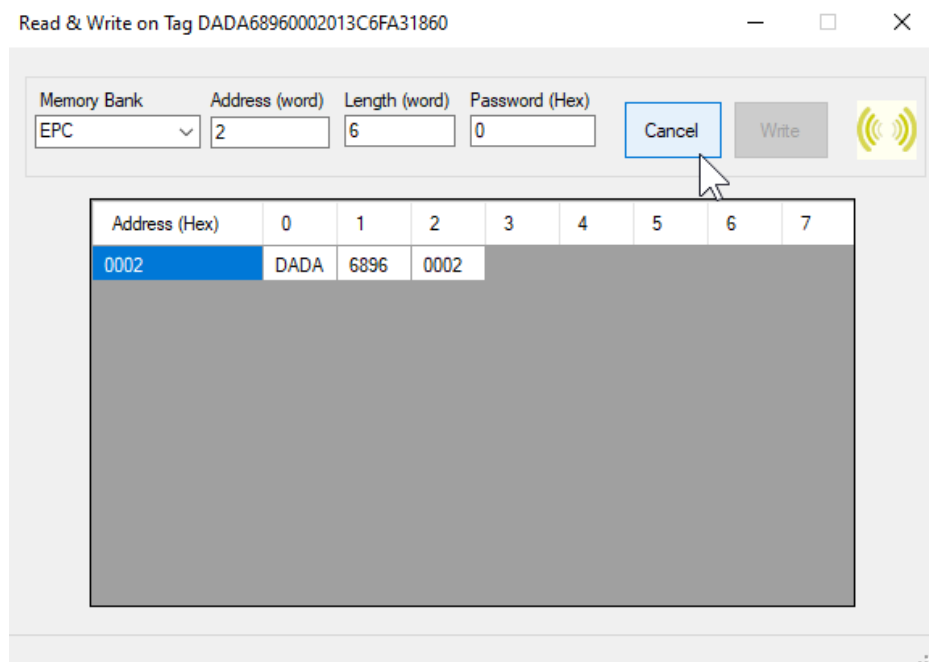
- Memory Bank: a combobox permits to choose the memory bank (RESERVED, EPC, TID, USER) where to perform the read/write operation
- Address (word): here you can specify the start address (word-oriented integer number) for the read/write operation
- Length (word): (only for the read operation) here you can specify the number of words (an integer number) you want to read starting from *Address*
- Password (Hex): here you can put the access password (hexadecimal characters)

### Read operation

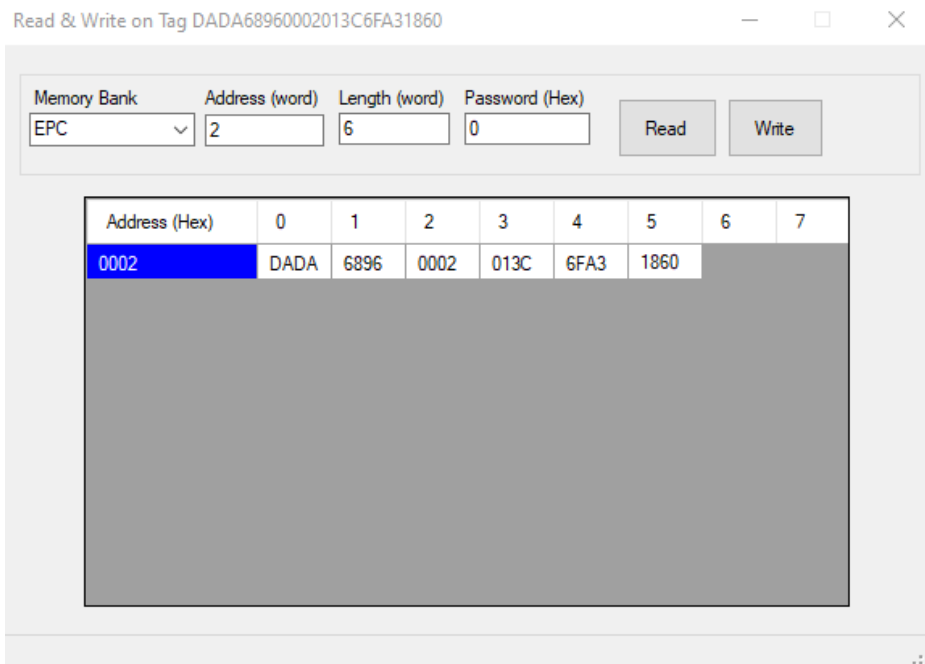
Refer to the precedent paragraph to set the read options (memory bank, address, length, password).

Then click on the *Read* button to perform the read operation.

To stop the reading activity in progress, press on the “Cancel” tab:

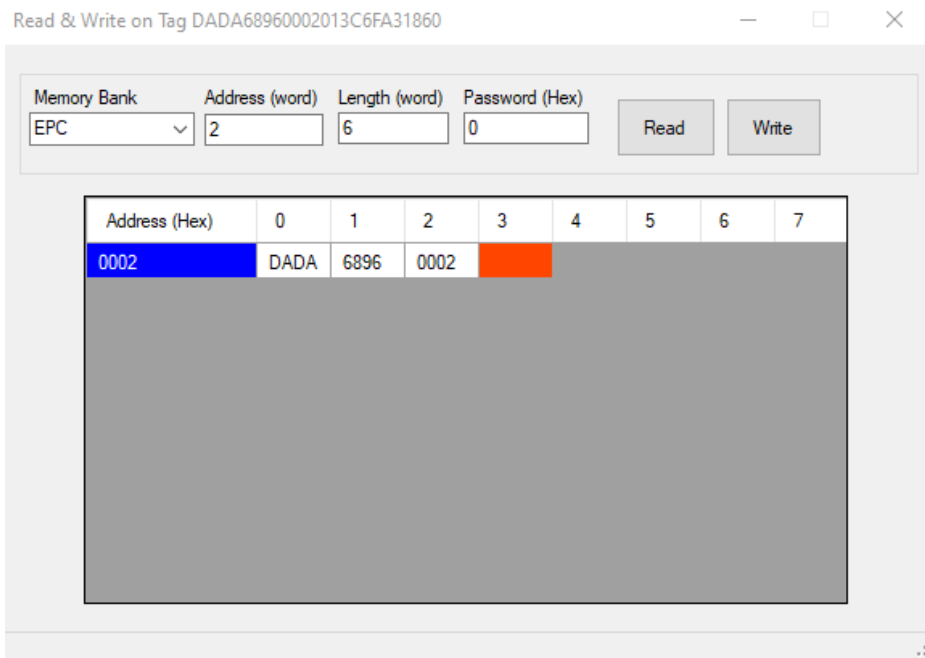


In case of successful read:



A red box indicates an unsuccessful read, the causes could be:

- the tag is no more under the antenna field
- inaccessible – bank is read-protected – by a previous lock operation
- not existing area



### Write operation

Refer to the precedent paragraph to set the write options (memory bank, address, length, password).

As an example, consider the following mapped area:

Read & Write on Tag DADA68960002013C6FA31860

Memory Bank	Address (word)	Length (word)	Password (Hex)		
USER	0	2	0	Read	Write

Address (Hex)	0	1	2	3	4	5	6	7
0000	2345	122B						

Memory written successfully!

You can put the value (a word) you want to write directly in the boxes of the mapped area.

The yellow colour indicates the modified boxes:

Read & Write on Tag DADA68960002013C6FA31860

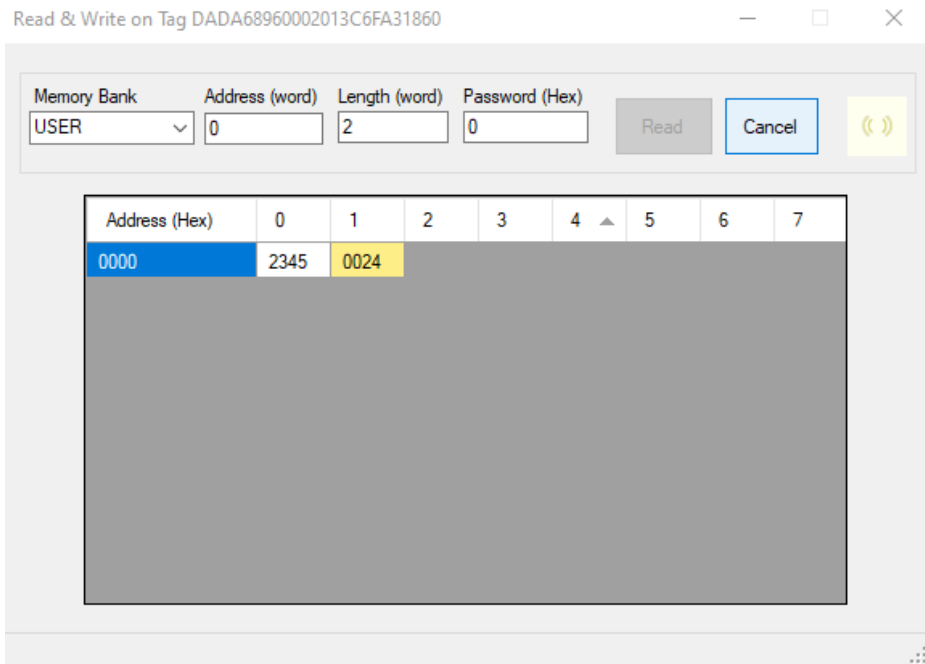
Memory Bank	Address (word)	Length (word)	Password (Hex)		
USER	0	2	0	Read	Write

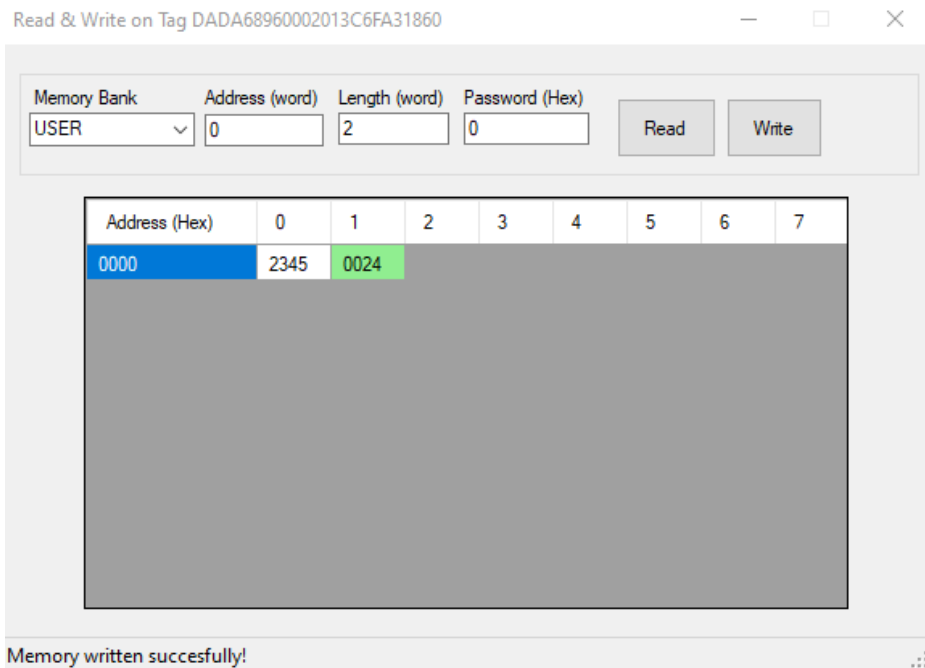
Address (Hex)	0	1	2	3	4	5	6	7
0000	2345	0024						

Then click on the *Write* button to perform the write operation.

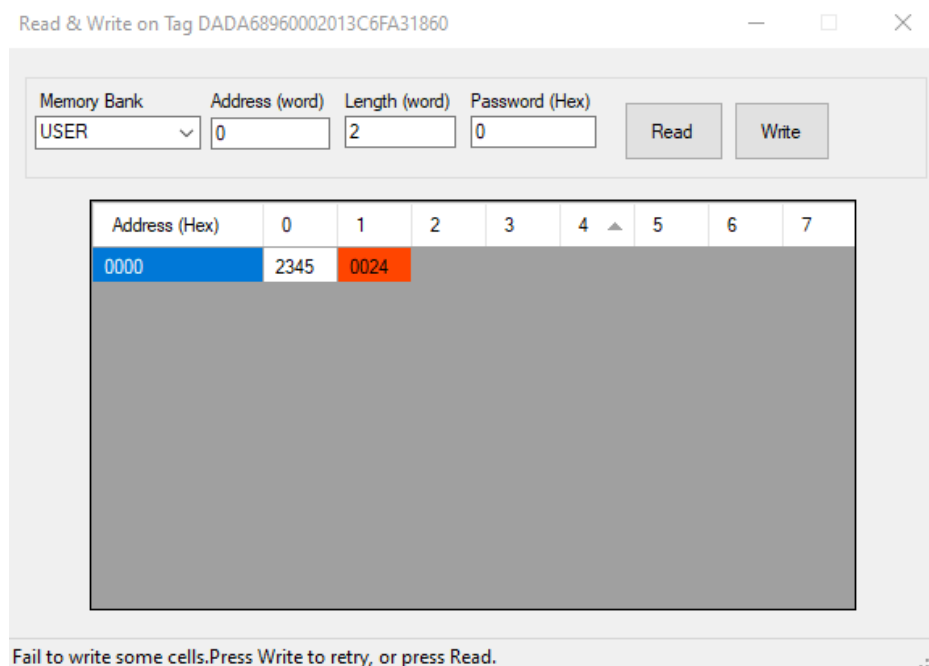
To stop the writing activity in progress, press on the "Cancel" tab:



A green box indicates that the writing operation is correctly performed and "Memory written successfully!" appears at the bottom of the screen:

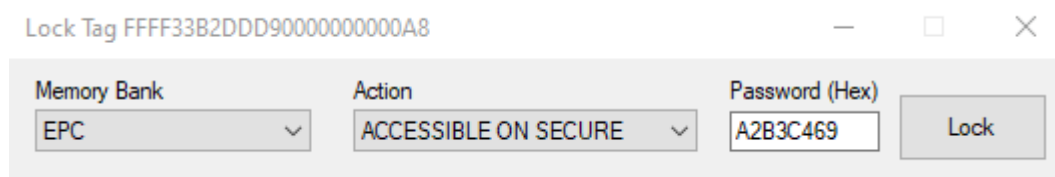


Instead, a red box indicates that the *write* operation failed and the *"Fail to write some cells. Press Write to retry or press Read"* appears at the bottom of the screen.



## Lock

The memory banks of the tag can be write-protected by using the *Lock* command.



The *Lock window* contains the following parameters:

- **Memory Bank:** a combobox permits to choose the memory bank or field (kill password field, access password field, EPC bank, TID bank, USER bank) where to perform the lock operation.
- **Action:** it contains a list of four lock modes available:
  - ACCESSIBLE: the bank is accessible, no need to provide password to operates on this bank
  - PERMANENT ACCESSIBLE: bank is permanent accessible, and it cannot be locked anymore
  - ACCESSIBLE ON SECURE: bank is accessible only if the password is provided
  - PERMANENT INACCESSIBLE: bank is permanently locked, and cannot be made accessible anymore
- **Password (Hex):** here you can put the access password (4 bytes in hexadecimal characters)

*Lock* button: it performs the lock operation. An error message will appear if some parameter is wrong or the selected tag is no more under the antenna field.

*Note:* the lock command prevents the lock and write operations on EPC, TID and USER memory bank while it prevents read, write and lock operations on the kill password and the access password memory fields contained in the RESERVED memory bank as specified by the following table *Tab. 3.1: Lock – Action-field functionality* page 32.

pwd-write	permalock	Description
0	0	Associated memory bank is writeable from either the <b>open</b> or <b>secured</b> states.
0	1	Associated memory bank is permanently writeable from either the <b>open</b> or <b>secured</b> states and may never be locked.
1	0	Associated memory bank is writeable from the <b>secured</b> state but not from the <b>open</b> state.
1	1	Associated memory bank is not writeable from any state.

pwd-read/write	permalock	Description
0	0	Associated password location is readable and writeable from either the <b>open</b> or <b>secured</b> states.
0	1	Associated password location is permanently readable and writeable from either the <b>open</b> or <b>secured</b> states and may never be locked.
1	0	Associated password location is readable and writeable from the <b>secured</b> state but not from the <b>open</b> state.
1	1	Associated password location is not readable or writeable from any state.

**Tab. 3.1: Lock – Action-field functionality**

The ISO-18000-6C (C1G2) standard specifies that each tag manufacturer should locate the *kill password* in the first four byte of the RESERVED memory bank, while the access password should be in the next four bytes. The standard also specifies that the *kill command* will fail immediately in case the *kill password* is set to 0 (0x00000000).

## Kill

You can kill a tag using the *Kill* command.

Once selected *Kill* on the contextual menu the following *Kill window* will appear:



This window provides a password textbox and a *Kill* button; type the password (4 bytes in hexadecimal format i.e. A013B4F9) in the textbox and press *Kill*.

A dialog window will appear asking for a last confirmation.



**Warning:** Be aware when a tag is killed it won't work anymore!

Note that according to the ISO-18600C (Gen2) standard, if the kill password is equal to 0 (0x00000000), then the tag cannot be terminated.

## Information about the Easy Controller

Information on the CAEN RFID Easy Controller are available clicking on *About*.

This window shows the current revision of the .NET library used by Easy Controller.



# 4 EASY CONTROLLER OPTIONS

## Options window

On the main menu, clicking on *Settings* → *Options*, will open the Options window. This window has a tree-view on the left side with content in the right side. There are three main sections:

- General
- Reader Configuration
- Logical Source Configuration

These sections will be explained below.

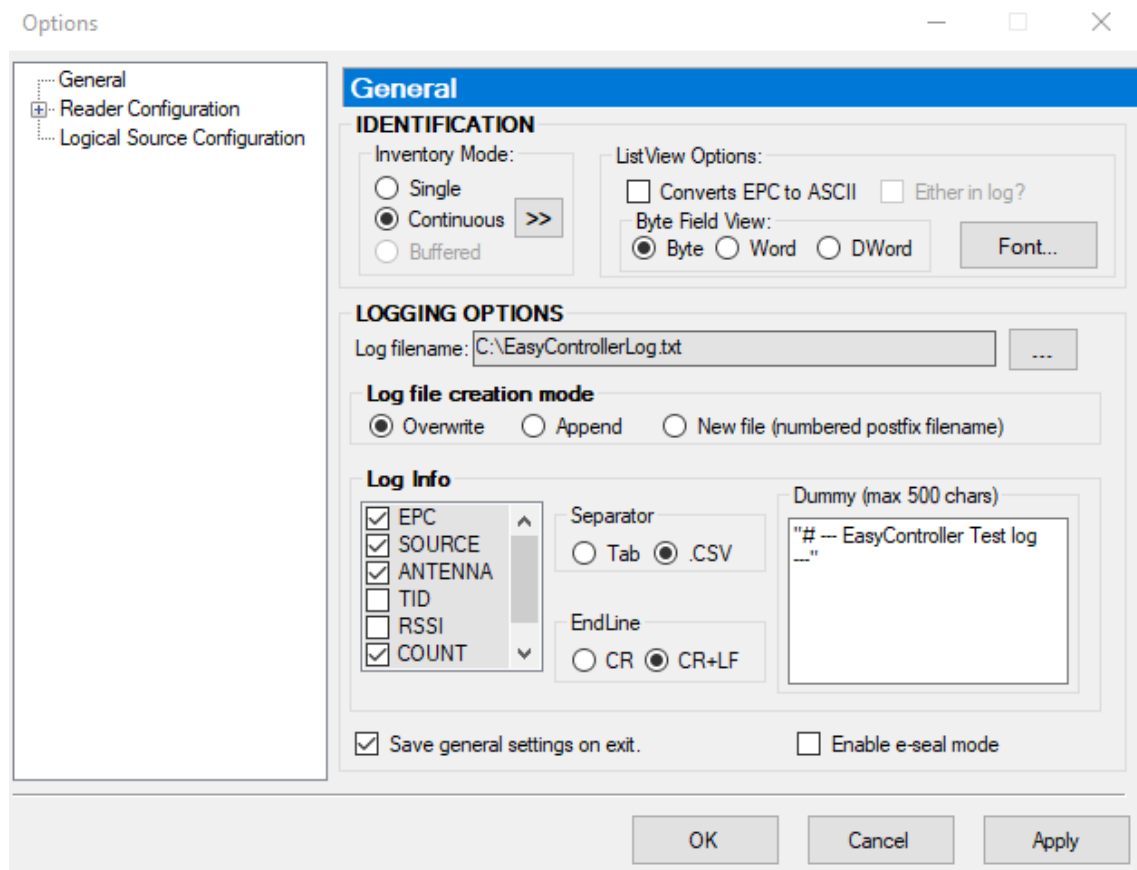



Fig. 4.1: General Options Window

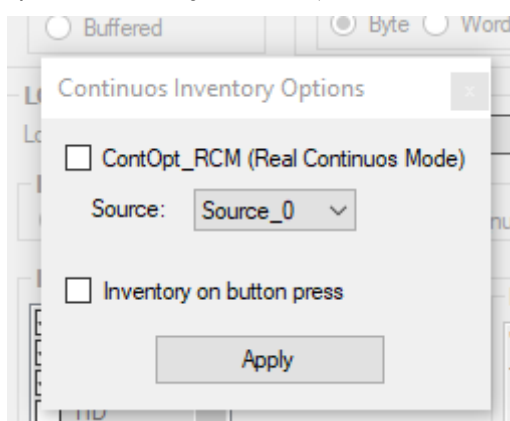
## General section

The *General* section deals with identification and logging options.

### Identification

*Identification* box contains inventory mode and listview options:

- **Inventory Mode.** There are three inventory modes: Single, Continuous and Buffered
  - **Single** mode performs a single inventory cycle each time the *Start Inventory* button is clicked
  - **Continuous** mode performs continuous inventory cycles until Stop Inventory button has been clicked.  
By clicking on  button you can access the *Continuous Inventory Options* window. Select the *Real Continuous Mode (RCM)* to perform continuous mode, i.e., a continuous inventory via hardware on the source indicated by the RCM Source parameter. If this mode is disabled, the inventory is performed in loop via software by the Easy Controller. *Inventory on button press* can be enabled only in the readers equipped with button and allows you to perform the inventory just by pressing the button (for more info, refer to the technical specifications of your reader).



**Fig. 4.2: Continuous Inventory Options window**

- **Buffered** mode takes the tags from internal buffer if available (when supported by the reader)

Note: when the Buffered mode is activated the *Start Inventory* button change to Download Buffer. If the reader you have connected doesn't have an internal buffer, this mode is disabled. Please refer to your reader documentation.

- **ListView Options.** In this area you can operate on the following parameters:
  - *Converts EPC to ASCII:* converts bytes of EPC in ASCII characters.
  - *Either in log?:* the EPCs in the log file will show as ASCII characters too.
  - *Byte Field View:* this groupbox is used to choose the byte field view (useful in case of long codes). The hexadecimal data can be grouping in:
    - Byte:* single byte
    - Word:* 2 bytes
    - Dword:* 4 bytes
    - Font:* opens a dialog to choose the listview font.

## Logging options

*Logging Options* provides a set of preferences for the logging session:

- *Log filename:* it is the file where all the logging informations will be stored: clicking on the button “...” will open a dialog where you can choose directory and filename.
- *Log file creation mode:* here you can select between three options:
  - *Overwrite:* at the end of the inventory session, a log file is created overwriting the existing one.
  - *Append:* at the end of the inventory session, new logged data are appended at the end of the existing file.
  - *New file:* at the end of the inventory session, new logged data will be stored in a new file. The name of the file will be created with an progressive number at the end (i.e. if the name for the log file is DumpTest.txt and it is stored in C drive, the first log file, with absolute path, will be 'C:\DumpTest00.txt').
- *Log Info:* here you can select the parameters you want to store on the log file:
  - In the first box you can select EPC, SOURCE, ANTENNA, TID, RSSI, COUNT and TIMESTAMP.
  - In the *Separator* box you can choose the separation mode: Tab (Tab separated values) or CSV (comma separated values) useful for most spreadsheet applications.
  - In the *EndLine* box you can choose the endline separator: CR or CR+LF.
  - *Dummy.* Here you can add some extra text information in the file (i.e. a description of a reader test).

In the e-seal mode the inventory operation will show an additional column of the e-seal tag status. This mode **operates only with e-seals:**

EPC	L. Source	Antenna	COU...	TimeStamp	ESeal [Word] + Status
00000000000000000000000000000000213520	Source_0	Ant0	8	10/12/2019 16:00:32	[9040] SEALED

If *Save on Exit* is checked all general settings will be saved on exit and they will be maintained for the next connection.

## Reader configuration

CAEN RFID Readers have some basic configuration parameters. By clicking on *Reader Configuration* you can access to the Power settings and Reader Protocol area.

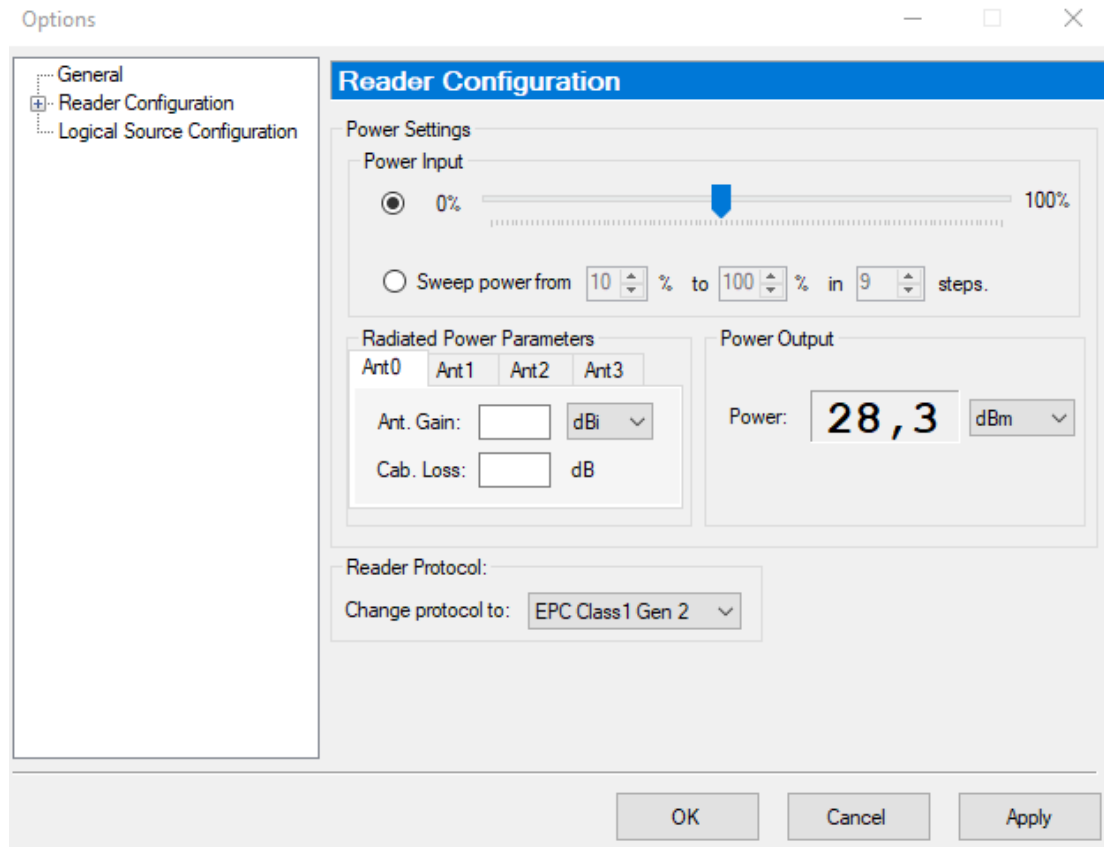


Fig. 4.3: Reader Configuration Window

### Power Settings Area

- *Power Input*. You can increase or decrease the output power of the reader moving the slider from 0% to 100%. Not all values can be accepted by the reader, therefore the reader approximates the chosen value to the nearest valid one when releasing the mouse button from the slider.
- In the *power input* box you can enable the *sweep power* mode. The sweeping power is useful in testing phase to assess the "hit rating" of a session of inventory. Specify the minimum and maximum percentage of power to be applied and the number of steps in which to divide the sweeping. As a result, each inventory cycle is repeated as many times as the steps indicated, starting from the minimum to the maximum percentage of power.
- *Power output* allows you to select the measurement unit (useful in case you want information on Conducted Power (mW dBm) or Radiated Power (mWerp)).
- *Radiated Power Parameters*. In this box you can set two parameters that allow to convert the Conducted Power into Radiated Power (\*erp and \*eirp units): *Antenna Gain* (expressed for linear – dBi - or circular antenna type – dBic) and *Cable Loss*.

## Reader Protocol Area

- *Change protocol to* allows you to change the communication protocol.

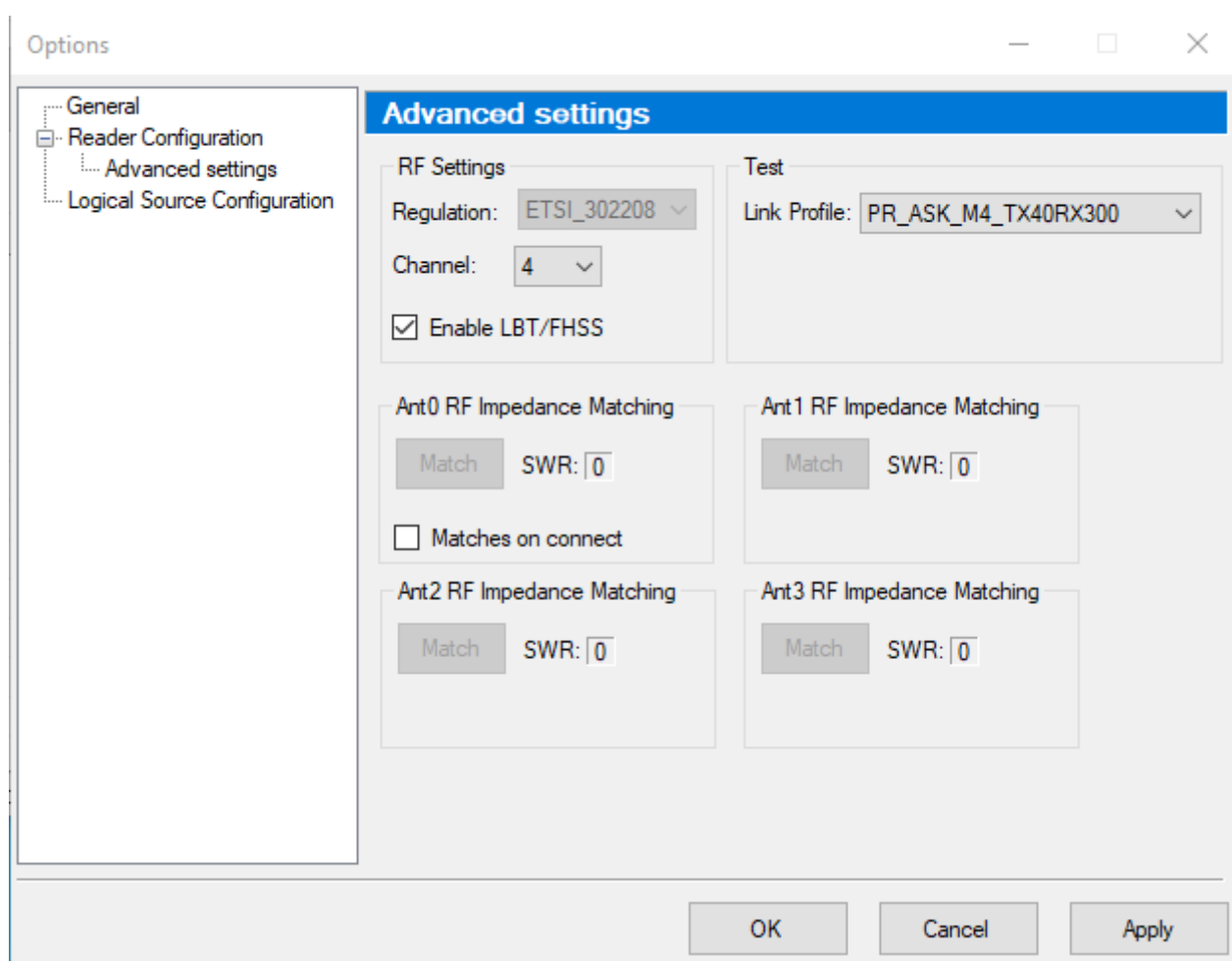
*Note:* in case of fixed power reader, the slider in the “Power Input” box is disabled.

*Note:* if your reader has an integrated antenna, the *Radiated Power Parameters* are disabled and the values are automatically set with the integrated antenna values.

## Advanced Settings



**Warning: This option is for advanced users only!**



- *RF Settings:*
  - *Regulation:* it is not possible to modify the regulation, because the RF settings must match the country/region of operating to comply with local laws and regulations. The usage of the reader in different countries/regions from the one in which the device has been sold is not allowed.
  - *Channel:* modify the channel number in case of interferences.
  - *Enable LBT/FHSS:* by default the LBT (Listen before talk) or, depending on the regulation, the FHSS (frequency hopping) are enabled.

- *Test:*
  - *Link profile:* only in case of reading difficulties, you can modify the value of the link profile to increase the reading data rate.
- *Ant[0-3] RF Impedance Matching:*
  - *SWR* is the result of the impedance matching operation.
  - *Matches on connect:* enables the reader impedance automatch (if supported by the reader).

## Logical source configuration

Logical sources concepts are described in paragraph *Before starting: CAEN RFID reader system overview* page 6.

This section is divided into two parts:

- *Source Configuration*
- *Summary*

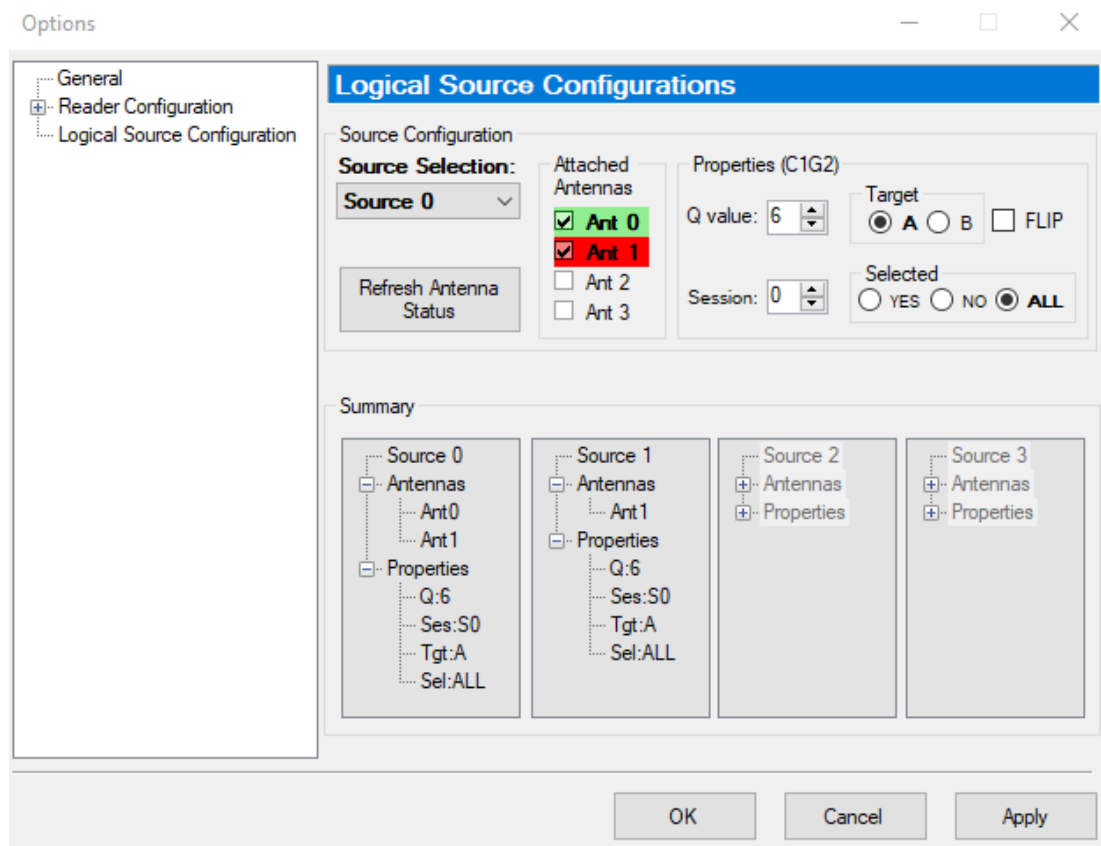


Fig. 4.4: Logical Source Configuration Window

## Source configuration

To configure a logical source follow the steps below:

- Select a source from the *Source Selection* combobox.
- Check/uncheck the antenna to add/remove it from the selected source.

The status of the antenna is indicated by colour:

- Red: bad-connected or broken antenna
- Yellow: poor signal from antenna
- Green: well-connected antenna

Press "Refresh Antenna Status" button in case you need to check the antenna status.

On the *Properties (C1G2)* area you can select some EPC parameters (Q value, Session, Selected and Target). For further details on these parameters, please refer to EPC Class 1 Gen 2 specification document [RD1]. Click *OK* or *Apply* to change settings.

*Note:* Q parameter is useful for the optimization of the inventory efficiency: as a rule of thumb, if you have to read a huge population of tags you need to select a high value for the Q parameter (7 or higher), otherwise you can select a lower value.

*Note:* if your reader has one antenna connector, only Ant0 (first Antenna) and Source 0 are available.

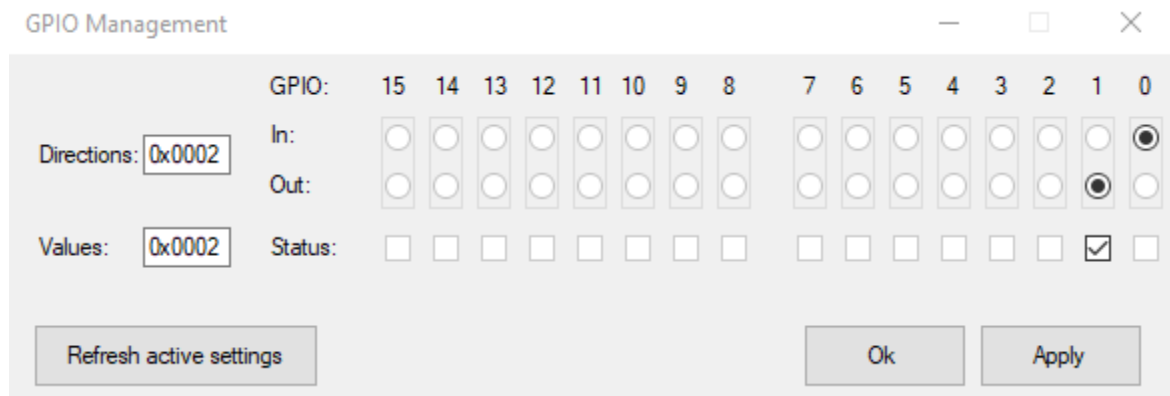
## Summary

Here you can find the summary of all current sources settings.

# 5 GPIO MANAGEMENT

## GPIO Management Window

Clicking on *Tools → I/O Management*, the GPIO settings window will appear:



This window allows you to configure up to 16 GPIO (the number of enabled GPIO depends on the reader model). Direction and value are represented respectively by radiobutton and checkbox (if supported by the reader).

If the direction is set on output value, you can use the checkbox to set the output line value, if the direction is set on input value, the checkbox is disabled and its status reflects the input line value.

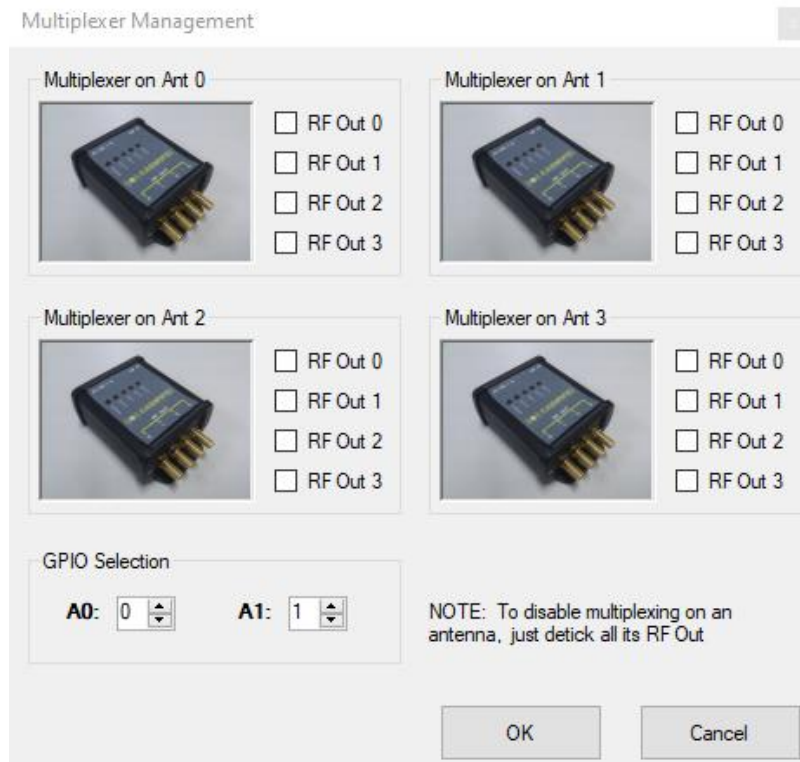
You can also find the hexadecimal word values of current settings, useful for programmers.

The *Refresh active settings* button reads and shows the current values, deleting all the non-applied changes made.



## Multiplexer Management Window

The Multiplexer Management Window allows you to configure up to 4 multiplexers simultaneously.



**Fig. 5.1: Multiplexer Management Window**

The GPIO to be used to drive the multiplexer are set through the parameters A0 and A1. If you want to disable a multiplexer on an antenna just uncheck all its RFout. Click "OK" to confirm, "Cancel" to cancel the latest changes.