AS321X Application Note – AN05
RAX user guide

Revision History

Revision	Date	Comment
2.0	2023-02-24	First version with revision history
2.1	2023-12-08	Update following a RAX update

Table of Contents

1. Description

The purpose of this document is to help customers using RAX software quickly perform data acquisition from an ASYGN tag. It explains how to set up a hardware bench and how the graphical user interface is organized.

2. Environment setup

The instructions below are given for an Impinj Speedway reader as an example. Other readers may be used similarly. Please always refer to your specific reader instructions and safety guidelines.

2.1. Hardware setup

The equipment needed is as follows:

1. Reader Speedway R420
2. Power supply of the reader
3. Reader antenna with its RF cable
4. ASYGN's tag(s) including an AS321X IC
5. PC/laptop

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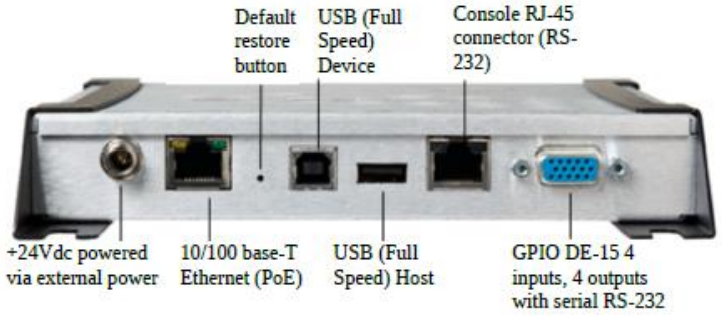
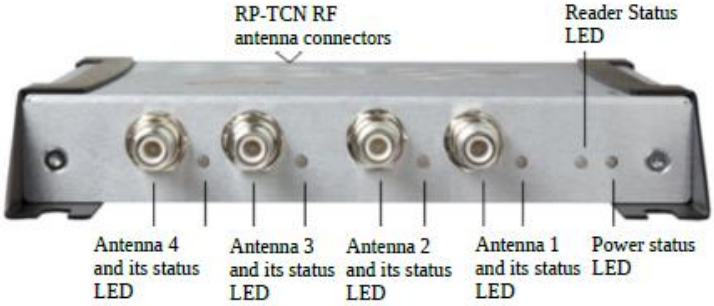
2.2. Installation

The connections available on the Impinj Speedway R420 are shown in the pictures below.



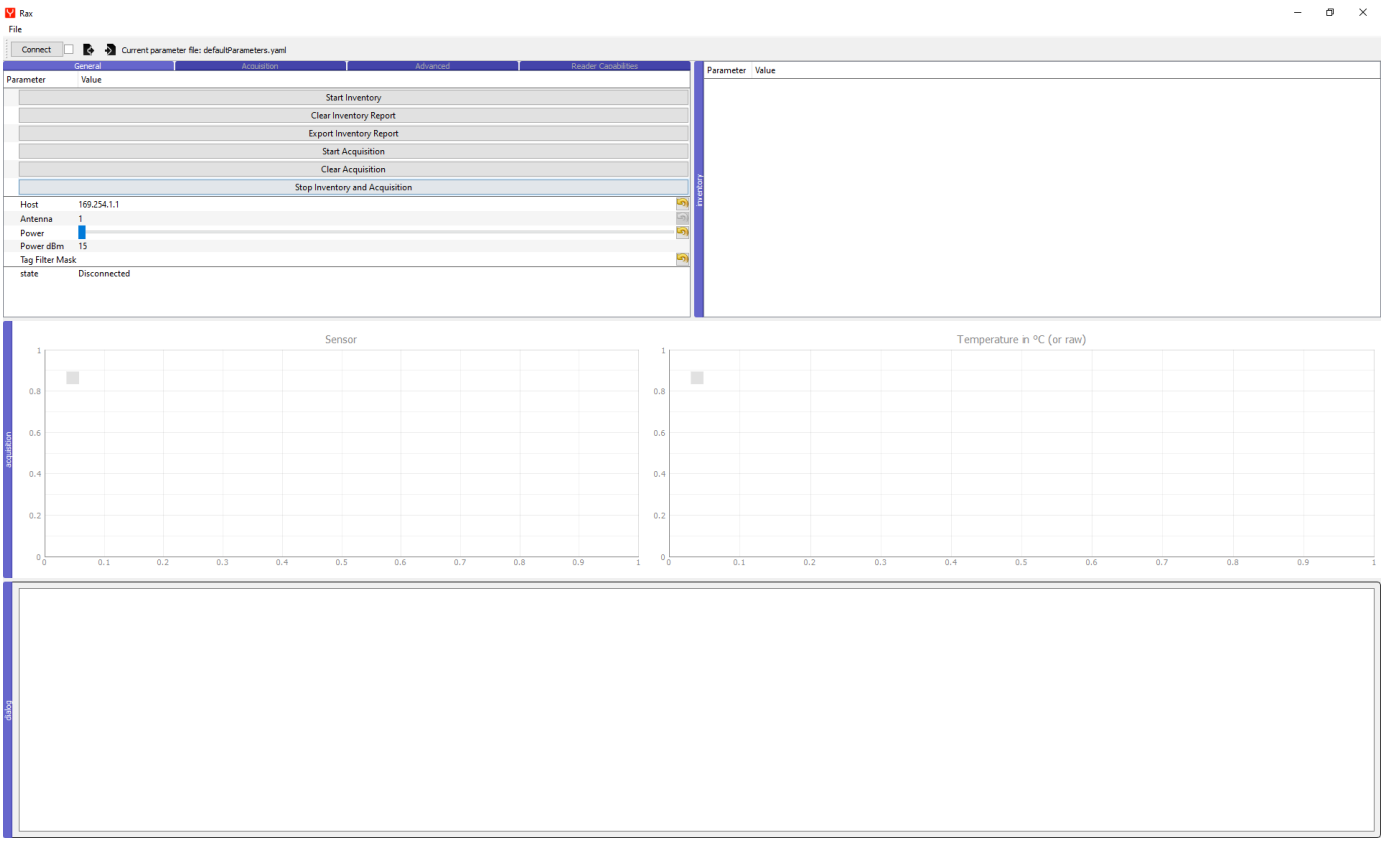


For the reader to work properly, the following steps must be applied.

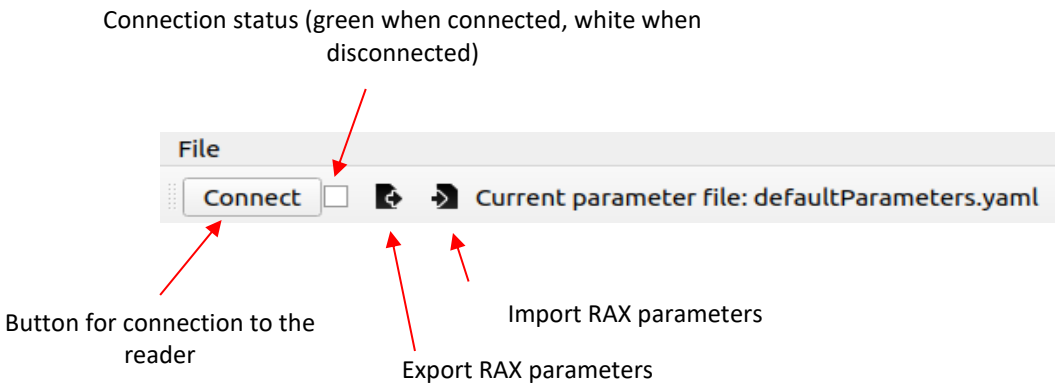
First, connect the reader's antenna using a coaxial cable. Power the reader from its main cord. Connect an Ethernet cable between the ethernet port of the Speedway reader and the PC/laptop. Then wait for the status of the LEDs to turn green permanently. Access the reader using its default IP address 169.254.1.1.

3. Graphical User Interface description

The GUI home page appears as shown below.



3.1. The header



3.2. The upper left sub-window

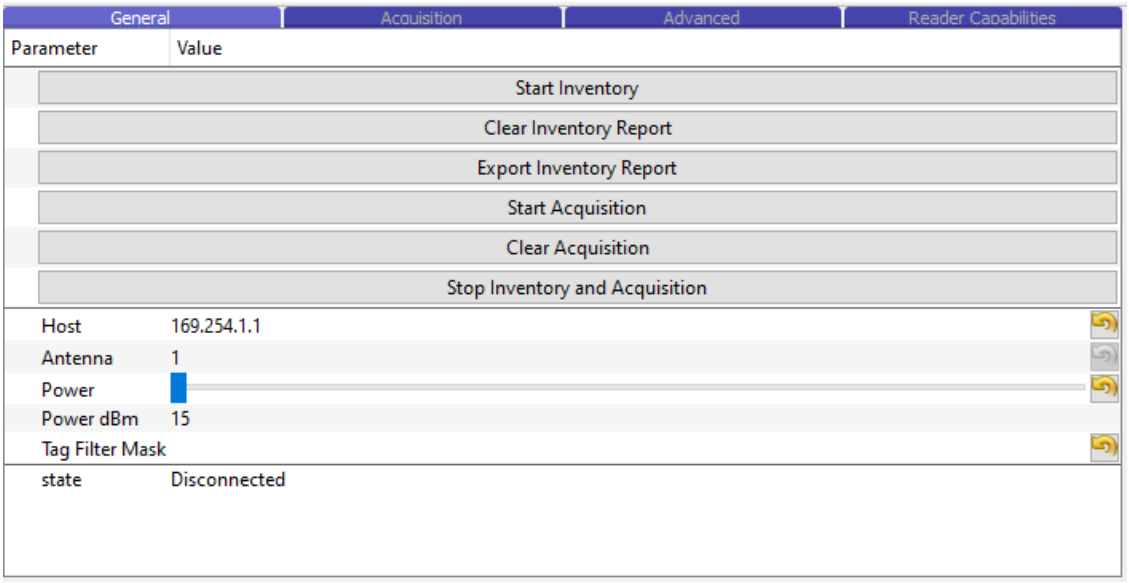
This sub-window consists of four tabs: *General*, *Acquisition*, *Advanced* and *Reader Capabilities*.

The *General* tab allows you to perform actions related to tag inventory or sensor data acquisition. It also allows some general settings such as modifying the host IP address, the antenna ID, the RF power emitted or even the use of a mask pattern to filter the tags according to their EPC value during inventory.

The *Acquisition* tab allows you to choose two specific parameters for the sensor acquisition: 1) unit used for temperature conversion and 2) sensor acquisition mode (please refer to ASYGN AN04 Application Note to know more about the different sensor acquisition modes).

The *Advanced* tab allows to modify the inventory record length and the reader settings: please refer to the reader manufacturer's technical datasheet.

And finally the *Reader Capabilities* tab allows you to see the capabilities of the reader when it is connected.



3.3. The upper right sub-window

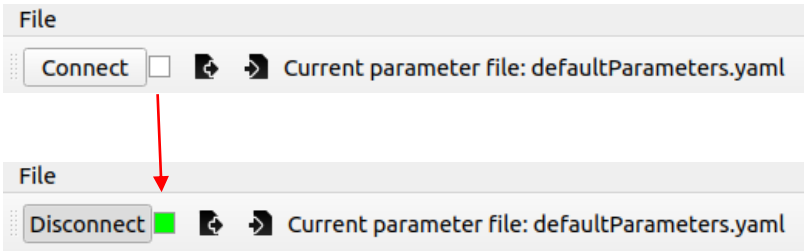
This sub-window will display the list of inventoried tags. It will also allow you to identify or read/modify the chip memory: please see next sections.

4. Getting Started

4.1. Reader controls and settings

1. Set the reader's **IP address** (169.254.1.1 by default).

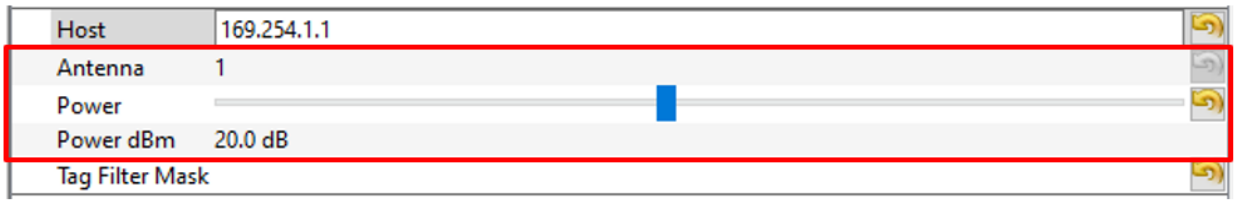
2. Press the *Connect* button, and wait for the green light as shown below:



Note: if the light remains white, then check:

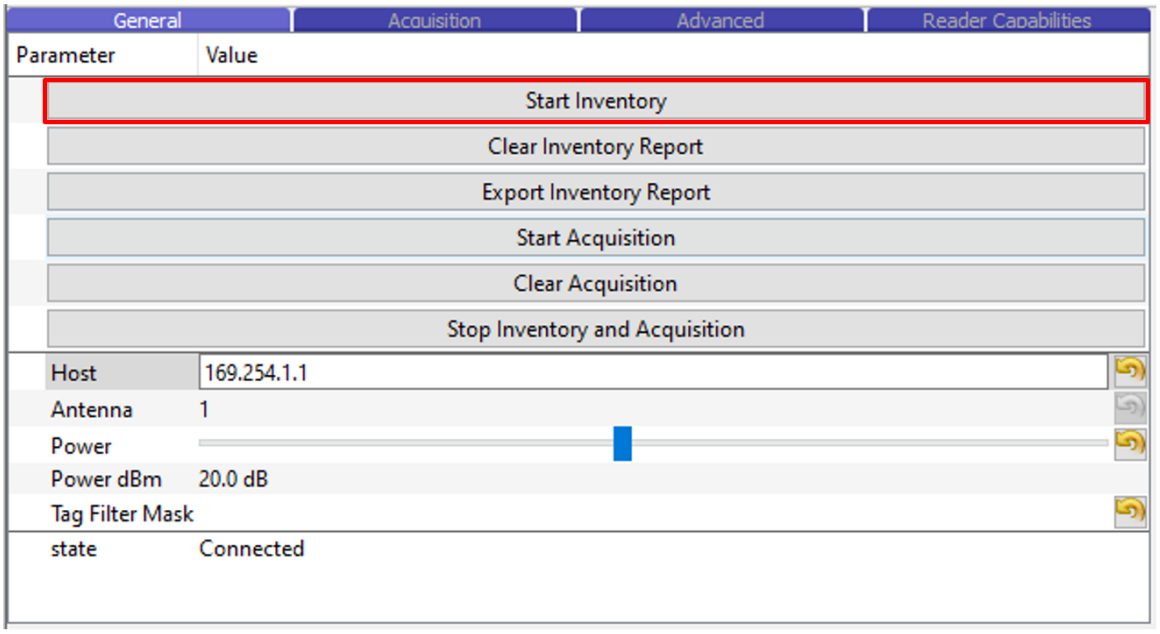
- *if the reader is on,*
- *if the Ethernet connection between the reader and the computer is ok and the reader's IP address is correct.*

3. Select an **antenna** and adjust the **TX power** of the reader (range from 10 to 31.5dBm for an Impinj R420 Speedway reader).



4.2. Inventory report

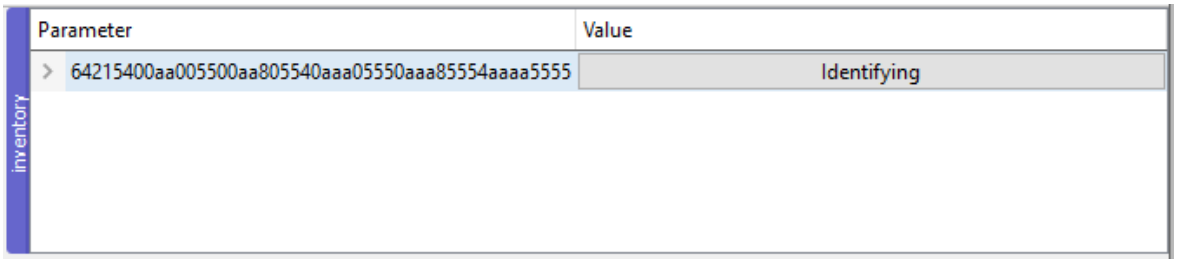
1. Click on *Start inventory*



The tag inventory function then runs continuously.

2. Place a tag in front of the reader antenna within a readable range (between 50cm and 5m).

   The tag's EPC number is automatically reported in the ***Inventory report***, as shown below.



   If the tag's EPC number does not appear, increase the TX power step by step from 10 to 30dBm in 0.25dB steps. NB: 30dBm is the maximum, assuming a 6dBi antenna: the max power allowed is 36dBm EIRP.

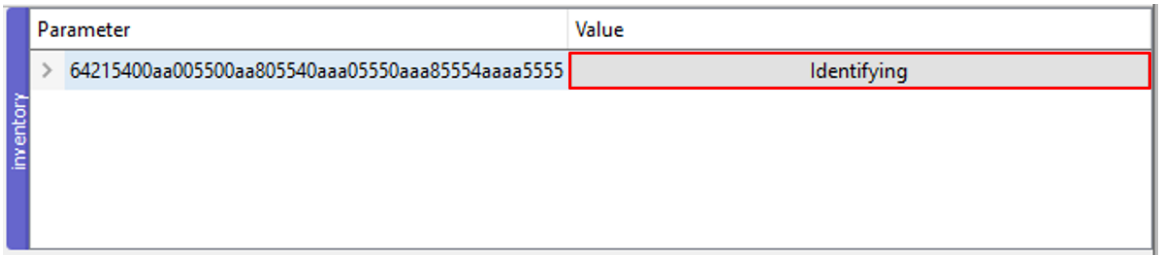
   *Note**:** if the inventory is not stopped while the reader is reading tags, it will continue to run.*

3. It is possible to refresh the inventory report with the ***Clear Inventory Report*** button while the inventory is running.

4.3. Identifying the IC version

RAX has an identification function, which allows you to know which IC version is used in the tag. This identification function only works with tags embedding an AS321X chip. The other tags are recognized as generic tags. Note: if an inventory is in progress, you must stop it (click on the ***Stop Inventory and Acquisition*** button) before you can use the identification function.

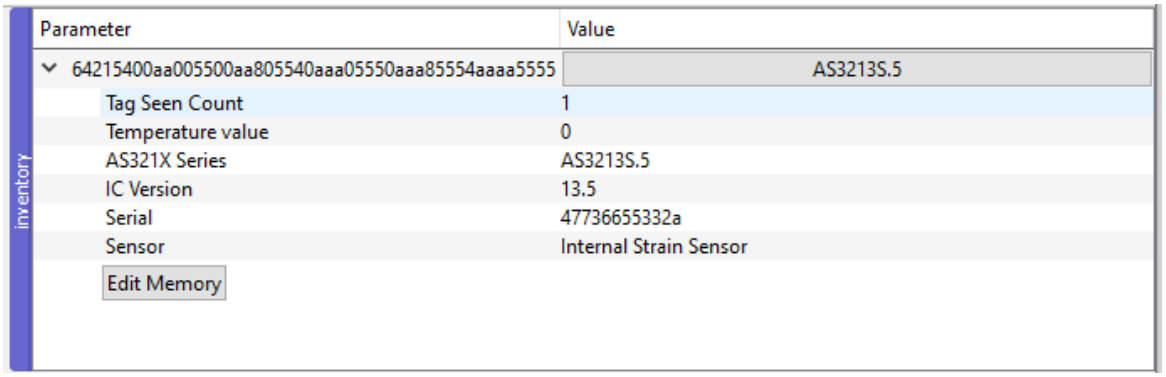
1. Click on ***Identifying*** button and wait (some readings are then performed in the non-volatile memory of the IC).



NB: if you encounter blocking problems at this stage, please refer to section 4.7: *Known problem and solution (with Windows version of RAX).*

2. As soon as the identification is completed, the IC model is displayed as follows:

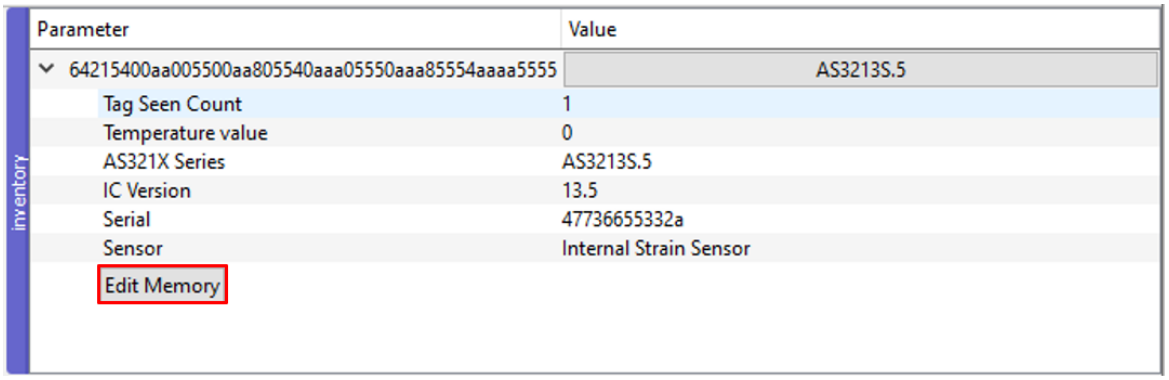
Note: simply expand the small triangle on the left of the EPC number to see the detailed identification information.



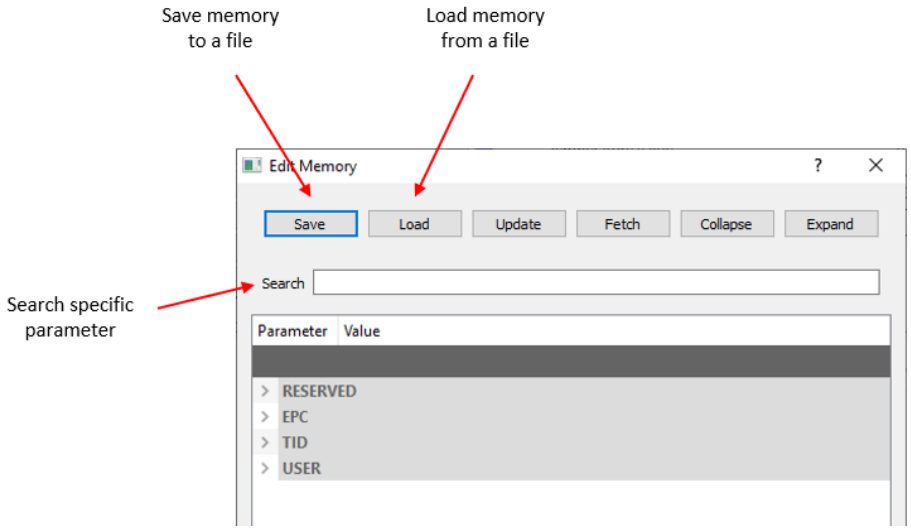
4.4. IC configuration

After the identification step, you can edit the memory of the IC by proceeding as follows.

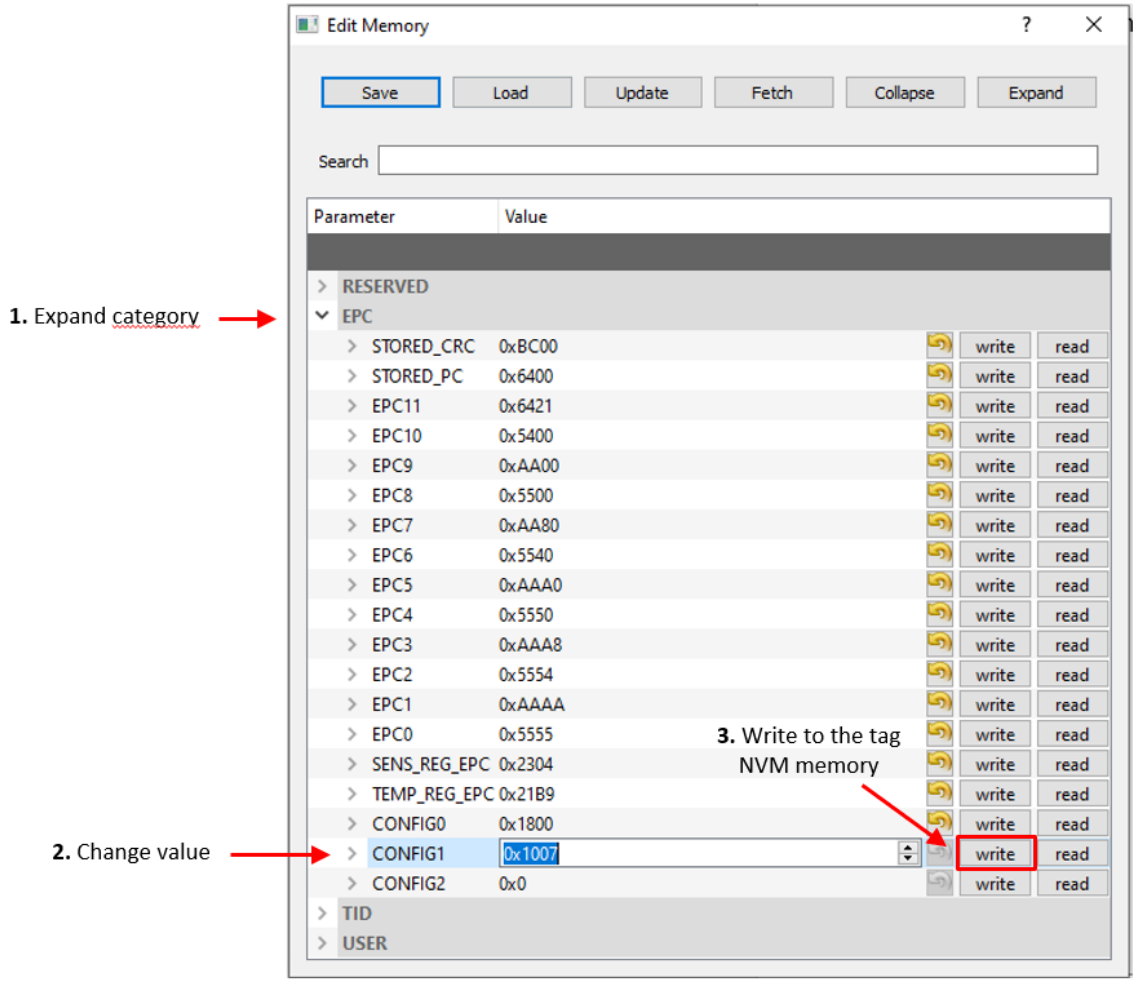
1. *Click on* ***Edit Memory*** button and wait for the reader to dump the memory.



2. The ***Edit Memory*** window below opens.



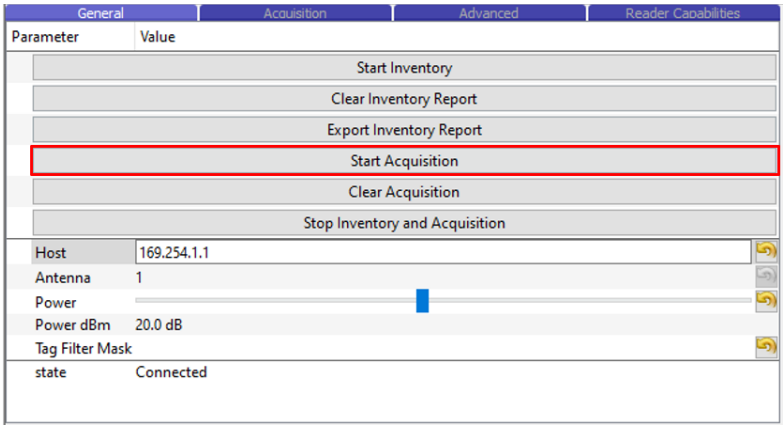
3. Edit the parameters you want to change (please refer to the datasheet of the AS321X ICs):



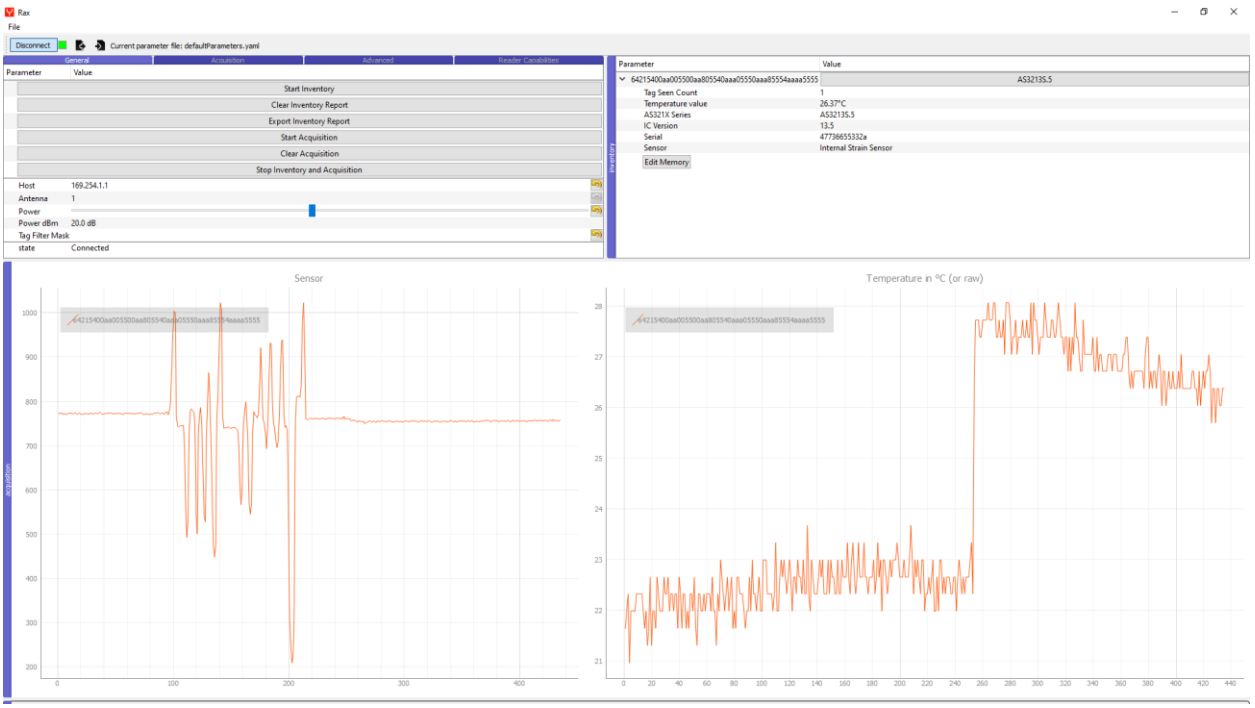
Note: if you want to reset the value, click on the yellow arrow.

4.5. Sensor acquisition

To start a sensor acquisition, press the ***Start Acquisition*** button:

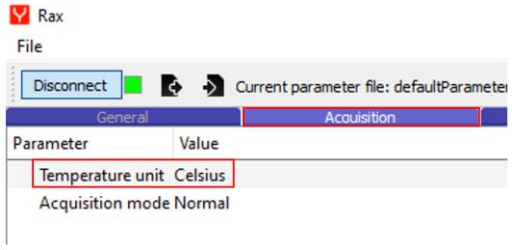


You can then see the sensor data displayed on a graph in the lower sub-window: temperature on the right, and the second sensor data on the left).

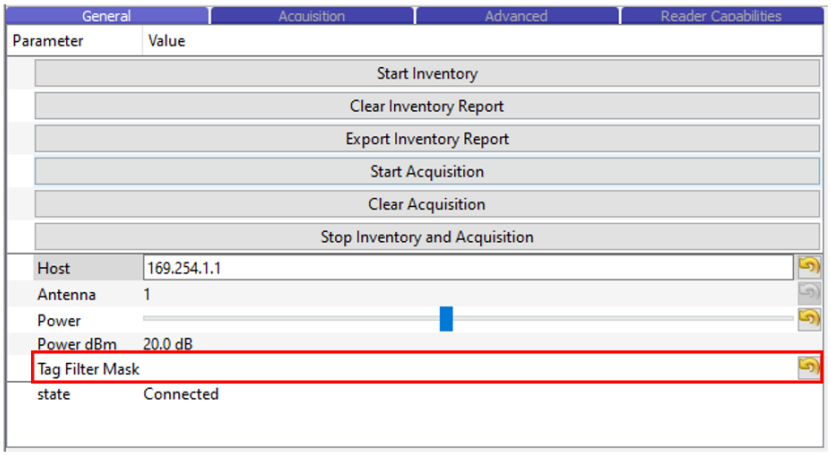


Note: if the IC has been identified before starting the acquisition, then the temperature sensor data is converted to °C (otherwise, the raw sensor data is displayed, as for the second sensor data on the left).

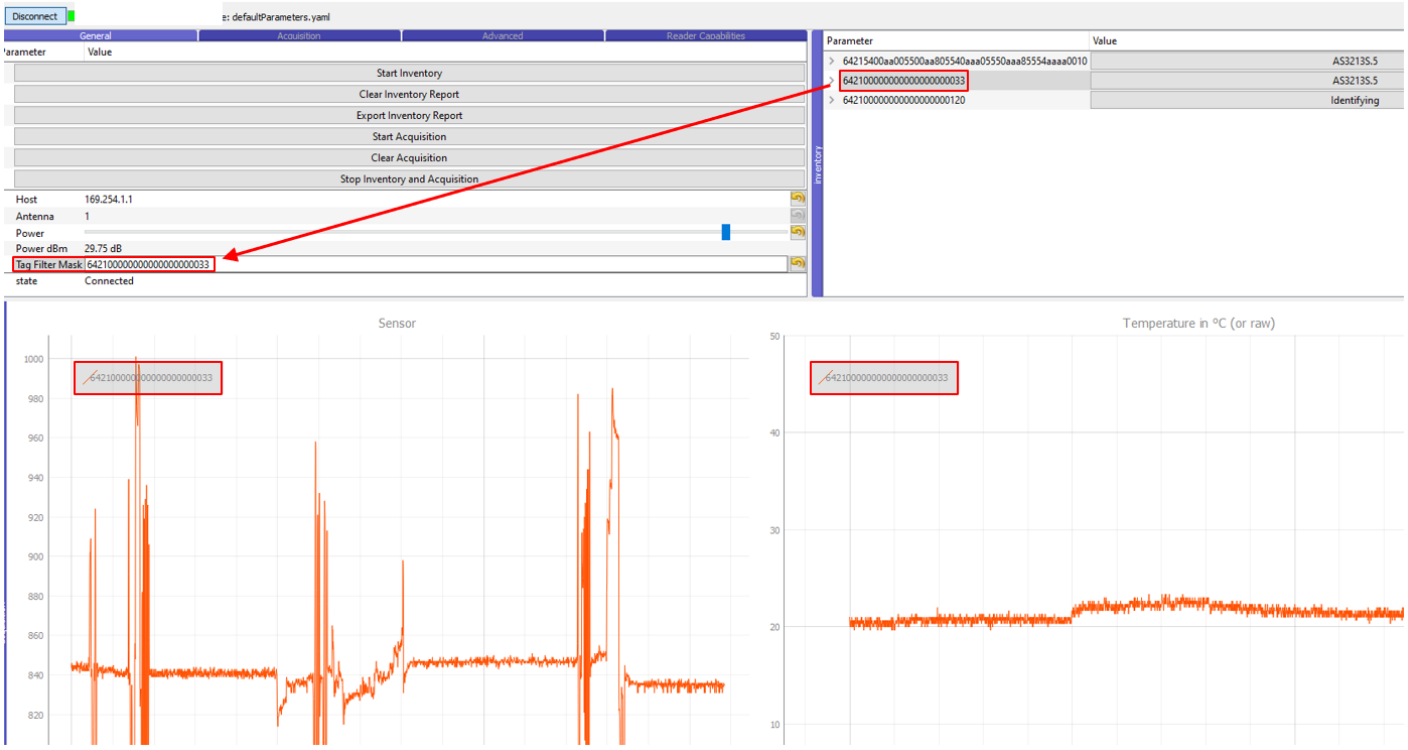
The unit of the temperature sensor data can be changed in the *Acquisition* tab in the upper left sub-window:



The “Tag Filter Mask” function can be used to select the tag(s) to be measured: only tag(s) whose EPC value matches this filter will be processed.

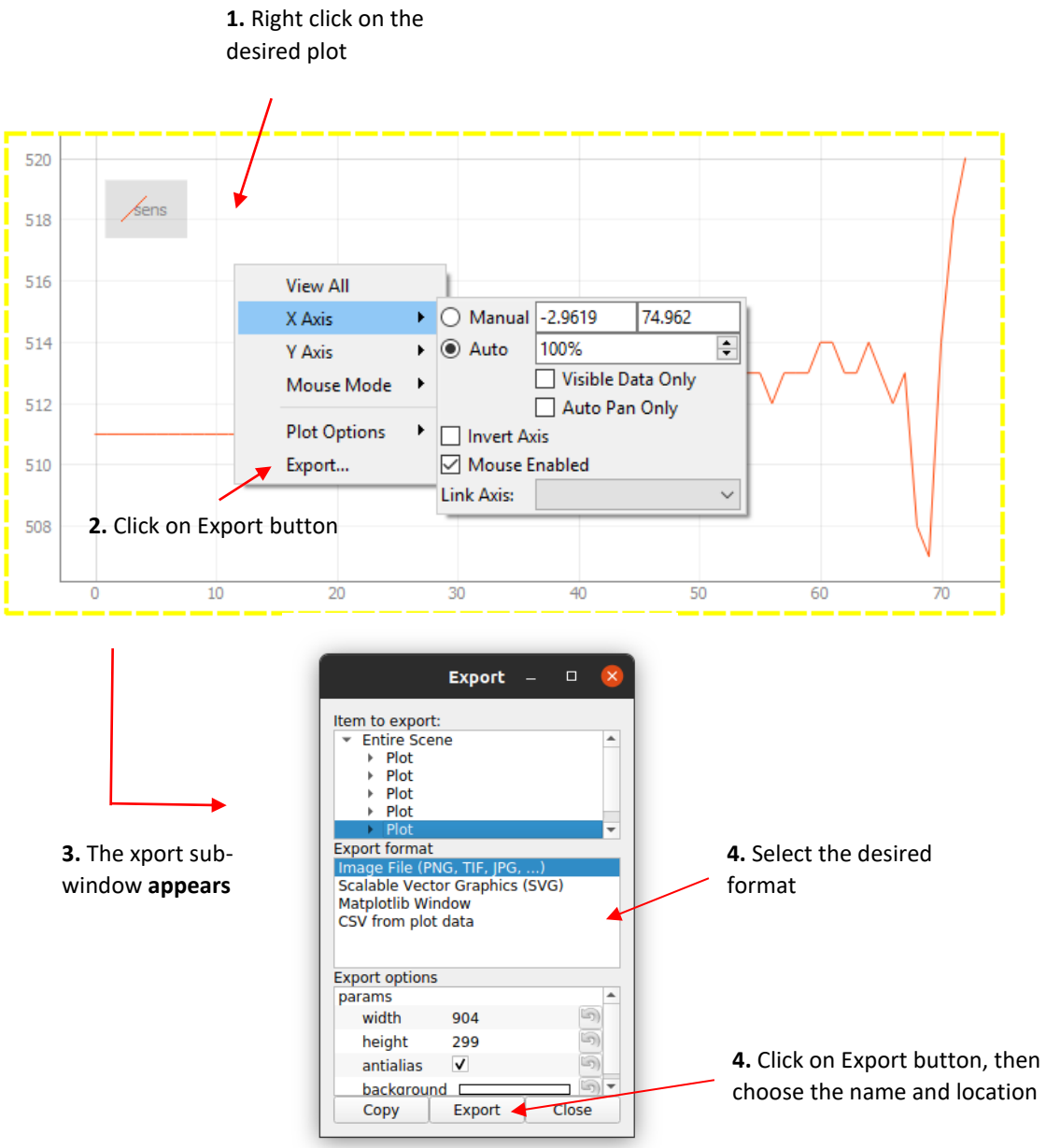


See an example below (right-click to copy the EPC value and paste it into the “Tag Filter Mask” field):



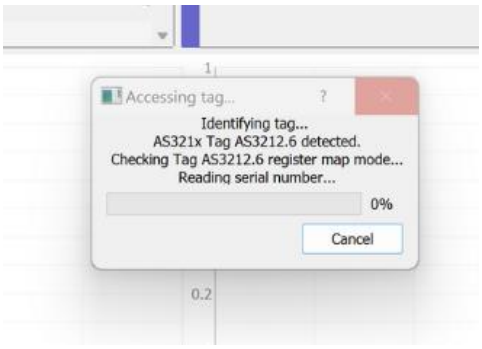
4.6. Plot options

The acquisition window offers data export options, as shown in the example below.



4.7. Known problem and solution (with Windows version of RAX)

You may encounter the following problem with the Windows version of RAX: when you try to identify the tag (by pressing the *Identifying* button), it either does nothing, or locks up at 0 or 30%, and you get the following error message:



This problem is due to an incompatibility between the RAX exe and the version of Windows you are using. It can be resolved by modifying the RAX exe properties as follows: