



CARD DESIGN & PRINT SOFTWARE

CardStudio™ 2.0

ENCODE GUIDE

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ZEBRA

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Encode Guide

Encode

How to create a 1k MIFARE Classic file

CardStudio Encode allows you to encode data from your PrintStudio project onto a smart card. With CardStudio Encode, CardStudio introduces a new file format that is used to contain all information related to the encoding of the card, which can easily and securely be shared with other parties who collaborate on the same project.

Contactless Encoding

CardStudio Encode currently supports the encoding of MIFARE Classic, Plus and DESfire cards. Encoding is done using card printers that are fitted with a “reader” such as the HID Omnikey or the Springcard Crazy Writer.

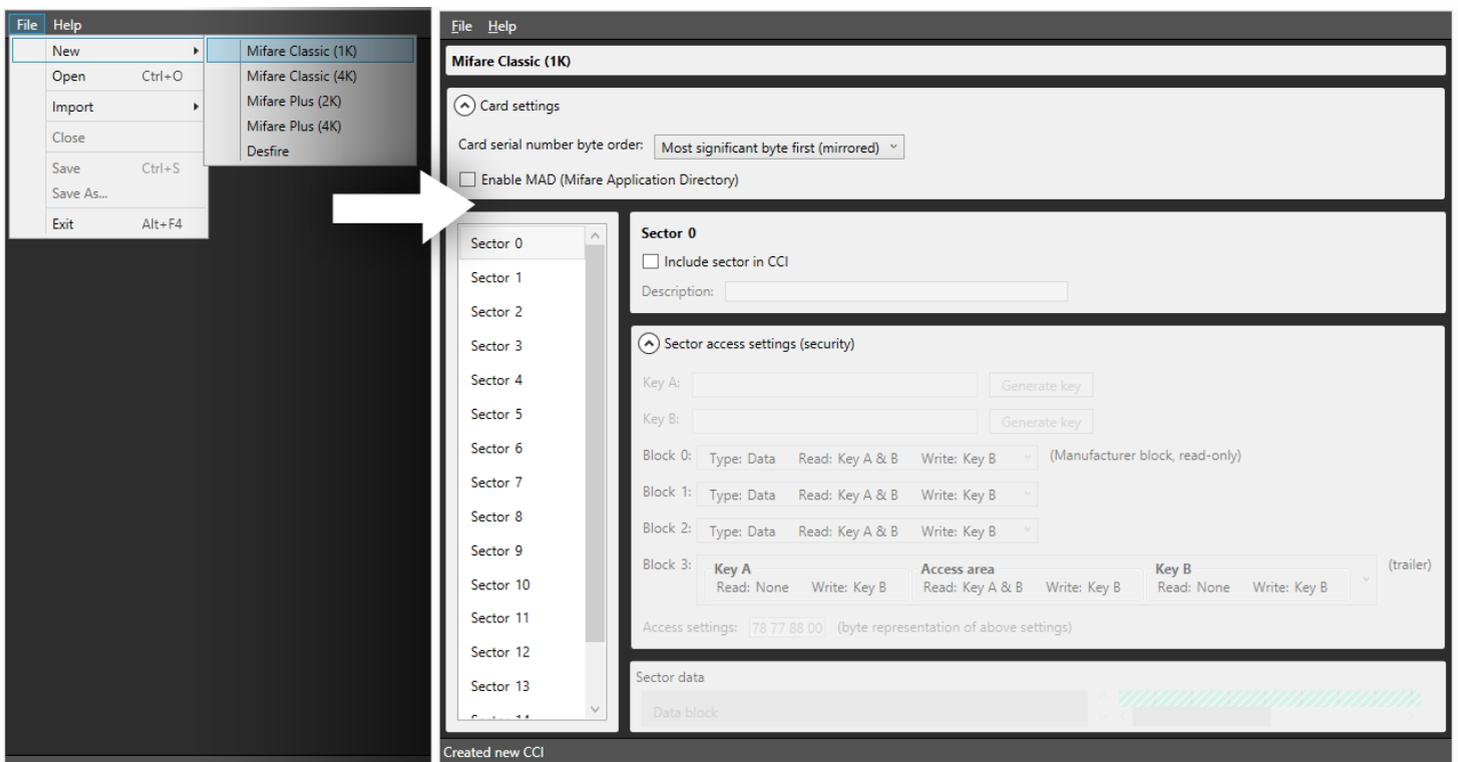
SmartCard Editor

The SmartCard Editor is a tool that is made available to all users of the CardStudio software package. This tool allows you to create an encoding template for MIFARE Classic, Plus and DESfire cards using all the major features for each of the standards.



Create a MIFARE Classic 1K example template using the Smartcard Editor

Launch the SmartCard Editor, which will open to a blank window. Choose “File” → “New” → “Mifare Classic (1k)”.

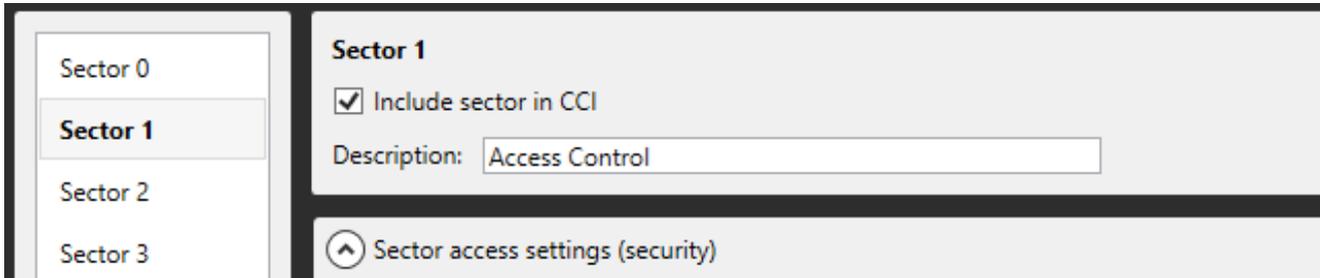


Step 1. Click on Sector 1 and add dynamic data to this sector

When creating an encoding file, we usually do not add data to sector 0. This is where the manufacture data is stored (serial number) so we will add data to Sector 1. Keep the “**Card Settings**” as it already is set and click on Sector 1.

Name the sector

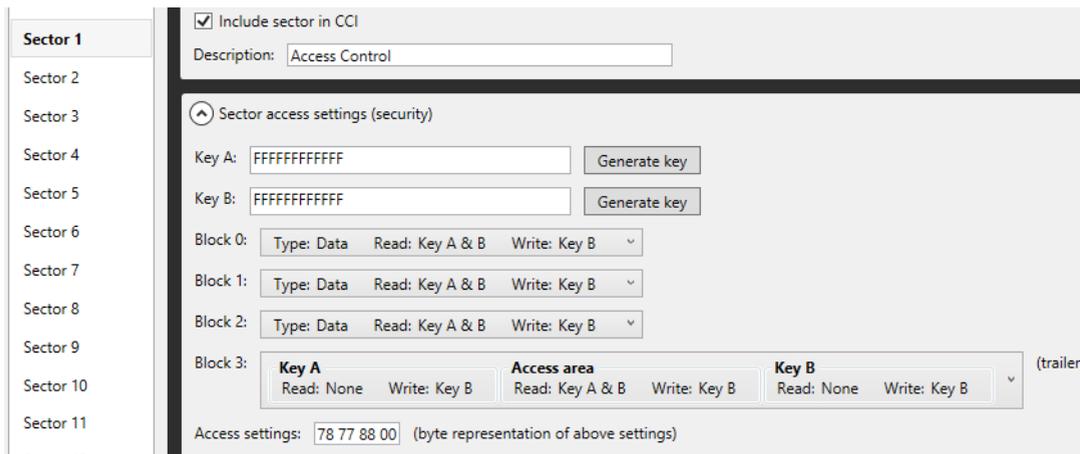
Check the box to include sector 1. into the encoding file. This sector will be used by for example the Access Control system, so we will name the description: **Access Control**



Set the Sector Access settings

For an external system to access the information in this sector they will need a key. Usually they provide you with the keys for your smart card, but you could also choose to generate the keys using the SmartCard Editor and give the keys to the access control organization who will need these keys. For this example, we will use the standard keys, so it will be easy to access this sector. Key A is mostly for read access and Key B for write access. We will keep the read and write settings for the sector blocks as is.

Enter for key A and key B the keys: FFFFFFFFFF



Add Dynamic Data to Sector 1.

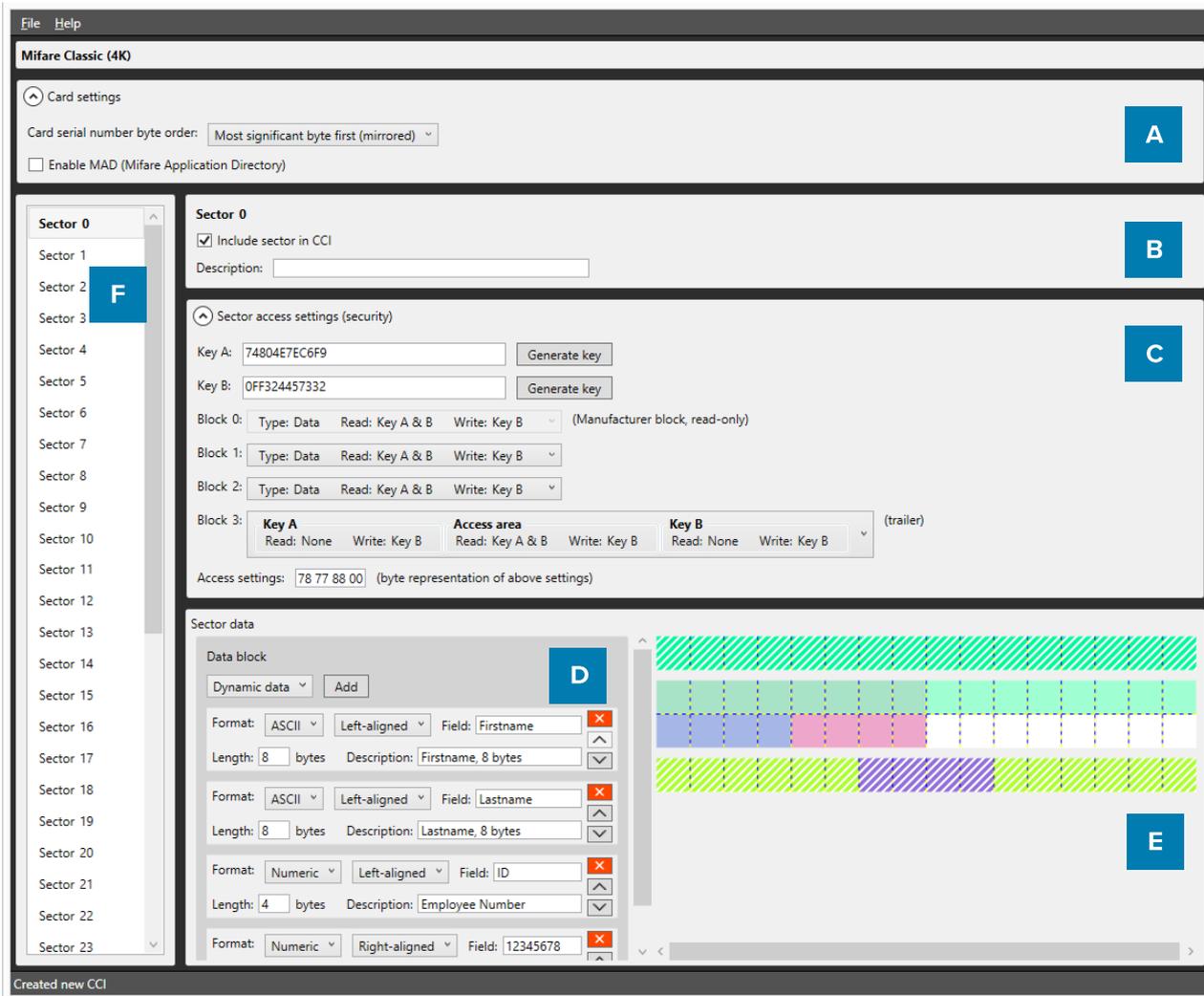
Go to the Sector data area, click on the dropdown menu to select dynamic data and click on the “Add” button. We added a dynamic field to the sector and to be able to recognize it when we are connecting the encoding file to the PrintStudio project, we will name the Field: **IDnumber**. We will keep the rest of the data settings, but will change the encoding to: **utf-8**



Step 2. Save your Mifare Classic Encoding File

The encoding file is created and setup to write the dynamic data (IDnumber) from the project to the smartcard to sector 1. Save and name the file and give the file a password.

General Information on a Mifare Classic Encoding File



- A. The Card Settings are displayed on top of the screen. You can define whether the card should use MAD Sectors (Mifare Application Directory documents directory-like structure that describes how sectors on card are used) or not. Enabling this setting will have an impact on specific sectors and their contents. It will also automatically generate Key A for sector 0 (and sector 16 for 4K cards).
 - B. Description of the Sector. (This could be the name of the data or the name of the area where this data will be used. Like “Cafeteria” or “Acces Control”)
 - C. Define keys, determine read and write settings for each of the four data blocks.
 - D. Create data segments to fill the available space.
 - E. The CCI Editor visualizes any data that will be encoded onto the Smart Card to give the user a better view of the amount of used and available space in each sector. Certain blocks (such as Block 0 on Sector 0, and the Trailer Block on all sectors) are reserved for manufacturer information and storing keys. These are not available to the user and are displayed as hatched.
- Each square represents one byte of information. When adding sector data, the length of the data is visualized on the right. Each item in the list is given a slightly different color to make it easier to understand how the data is transferred to the card.
- F. List of sectors is displayed, 16 for 1K cards, 40 for 4K cards. Depending on the settings, each of the sectors can contain information that will be encoded onto the card using PrintStudio.

Information about Sector Data

Sector data

Data block

Dynamic data Add

Format: ASCII Left-aligned Field: Firstname X

Length: 8 bytes Description: Firstname, 8 bytes

Format: ASCII Left-aligned Field: Lastname X

Length: 8 bytes Description: Lastname, 8 bytes

Format: Numeric Left-aligned Field: ID X

Length: 4 bytes Description: Employee Number

Format: Numeric Right-aligned Field: 12345678 X

Dynamic Data

This is information that will be added to the card by your CardStudio project. Like adding card designs, when you add a CCI file to your project, a pop-up will allow you to bind columns in your project to each of these items. You must always ensure that the data in your project corresponds with the settings you have chosen in terms of length and data type. The following data types are available.

- ASCII All standard ASCII characters are allowed.
- Numeric 0 ... 9
- Alphabetic A ... Z and a ... z
- Alpha-numeric A ... Z, a ... z and 0 ... 9
- Alphabetic and special A ... Z, a ... z and Punctuation marks
- Alpha-numeric and special A ... Z, a ... z, 0 ... 9 and Punctuation marks
- Binary-coded decimal (5) 0 ... 9, two digits in one byte, maximum 5 bytes
- Binary-coded decimal 0 ... 9, two digits in one byte
- Binary-coded decimal date YYYYMMDD each two digits in one byte
- Decimal 0.00 (Fixed point)
- Wiegand-26 Facility and card codes with parity
- Hexadecimal 0123456789ABCDEF
- Octal 012345678
- Binary 01

In addition, you can add a description of the sector data to remind you of certain agreements.

Constant Data

Constant or Static data is data that is manually entered in the CCI file and will never change. The format of this piece of information can be of any of the types mentioned in the Dynamic Data section.

Empty Space

This item can be used to indicate a specific part of a sector that will never be used.

Card serial number

This is a 10, 7 or 4-byte, data section which will automatically contain the card serial number when the card is being encoded.

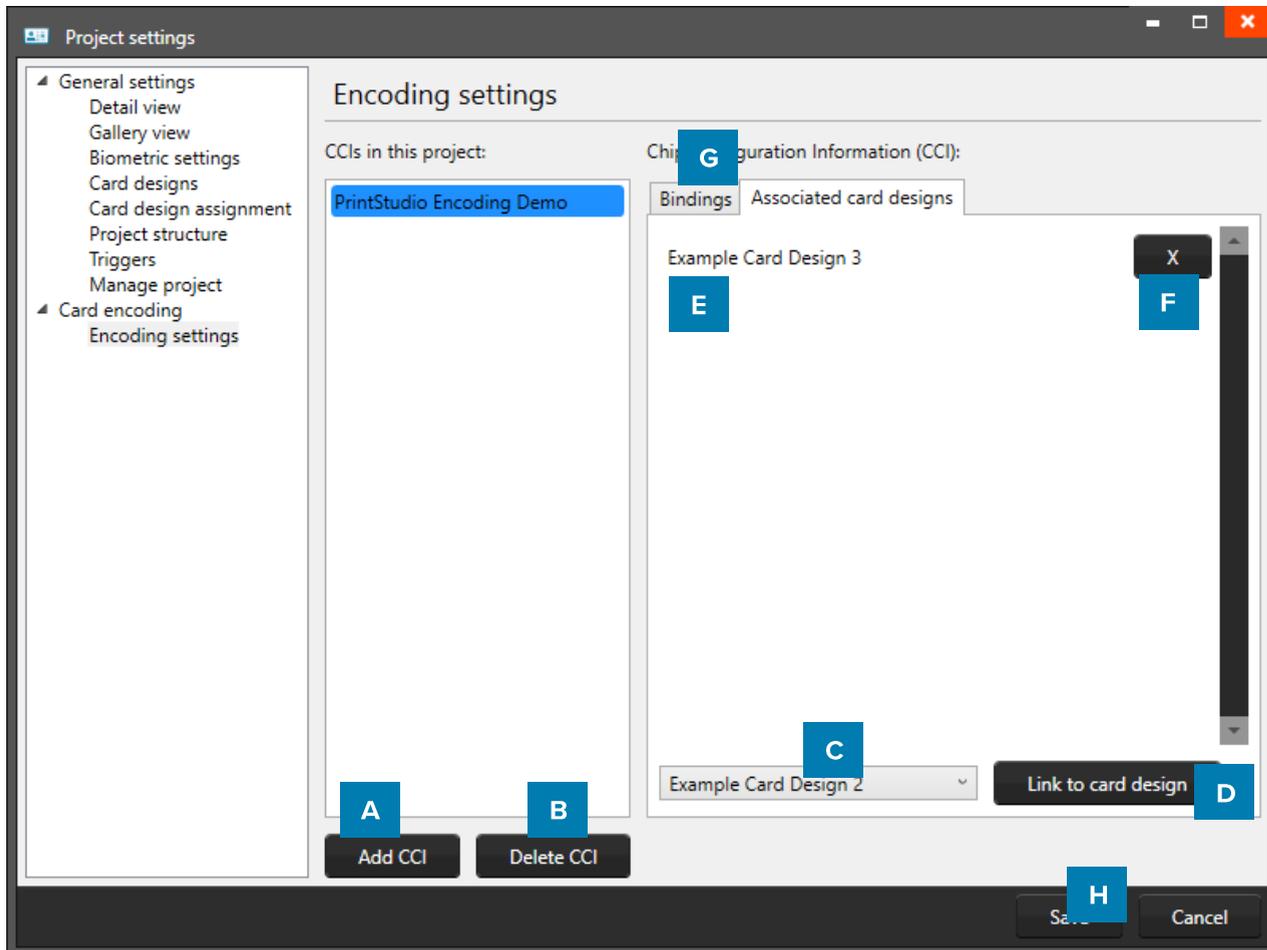
Using these options, you can create any type of CCI file. Once completed, you can save your work in either an unencrypted file (XML) or an encrypted CCI file. If you choose the latter option, you will be required to enter a password that will also be required when adding the CCI file to your CardStudio Identity project.

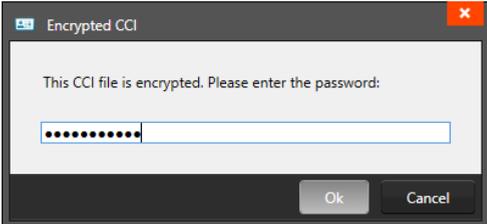
Encode

How to add your encoding file to your PrintStudio project

Open an existing Project with card designs and add the encoding file to this project

Encoding with CardStudio has been fully integrated into the printing process. The most important step to enable encoding is to add your encoding CCI file to your project. Go to the “[Project Settings](#)” panel and select “[Encoding Settings](#)”.

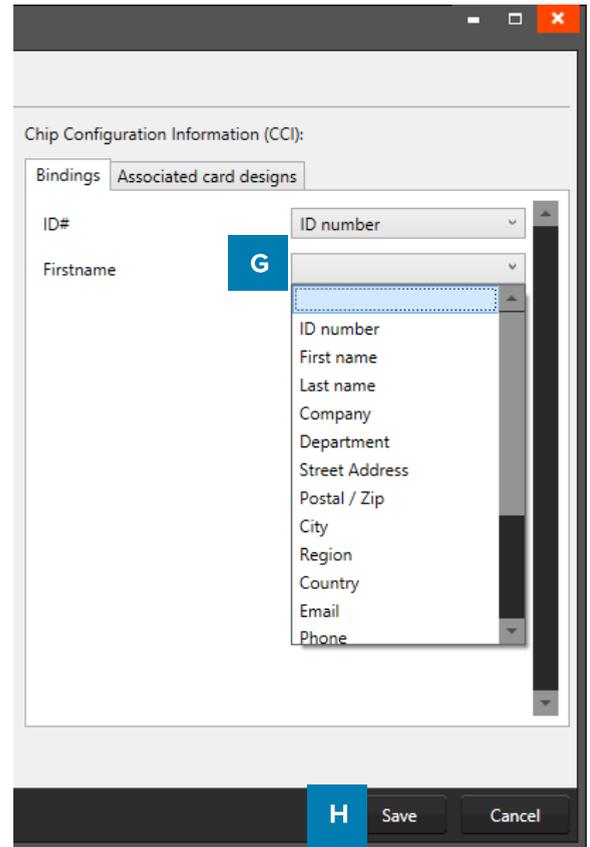


- A. Click on the “[Add CCI](#)” button and select the CCI-file you created with the CCI-editor and want to add to your CardStudio project to connect to the card designs. When your CCI-file has been secured with a password you first have to fill in the correct password before the file is added to your project.
- 
- B. When you added the wrong CCI-file or want to delete an old file you can select the file from the list and click on the “[Delete CCI](#)” button to delete the CCI-file from your project.
 - C. Select the CCI-file from the list to connect to a card design, then select the card design from the drop-down list.
 - D. Click on the “[Link to card design](#)” to link the card design to the CCI-file. Card holder Records with this card design will be encoded with the CCI-file linked to the card design.
 - E. Overview of all the card designs connected to the CCI-file.
 - F. Click on the “X” button to unlink a card design from the CCI-file.

Bind the dynamic data field from your encoding file to the data in your project

- G. Bind the dynamic data field (IDnumber) from your CCI-file to the data column (ID number) of your project by clicking on the “Bindings” tab and selecting the “ID number” data column from the drop-down menu.
- H. Click on the “Save” button to save the bindings and CCI files connected to your project card designs.

You are now ready to encode your cards. Encoding is easy, you select the records connected to the correct card design/CCI-file and click on the print button.



Note: You might need to configure your printer to perform both Encoding and Printing tasks at the same time, otherwise PrintStudio might list your print action as failed, even though encoding did take place.

Supported standards

CardStudio Encode currently supports MIFARE Classic, MIFARE Plus and MIFARE DESFire standards.

Encode

How to add a trigger to a project that reads the card serial number

Step 1. Open your project

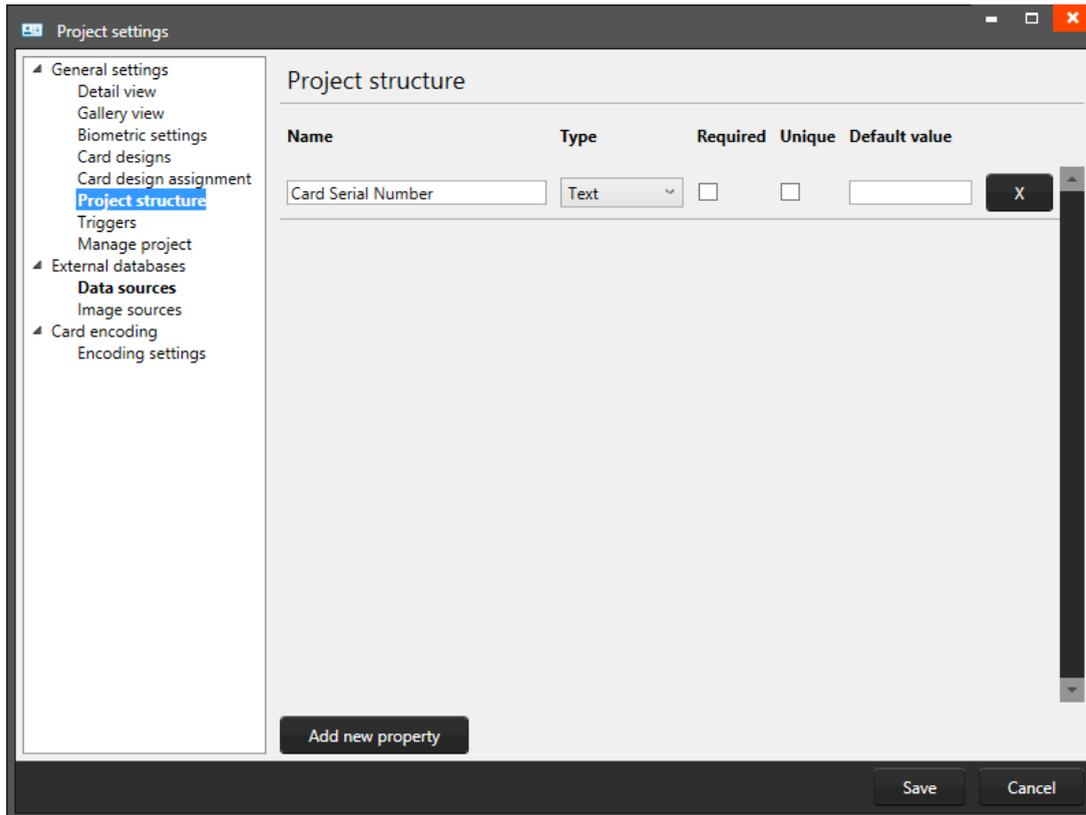
Open an existing project with card designs and data.

Step 2. Create an extra column for the card serial numbers

We want to add an extra column to the project, so PrintStudio can write the card serial number for a record that has been printed to the card serial number column in the project.

Go to “Edit” in the main menu and go to “Project Settings” and click on “Project Structure”. Click on “Add new property” and name this text data column:

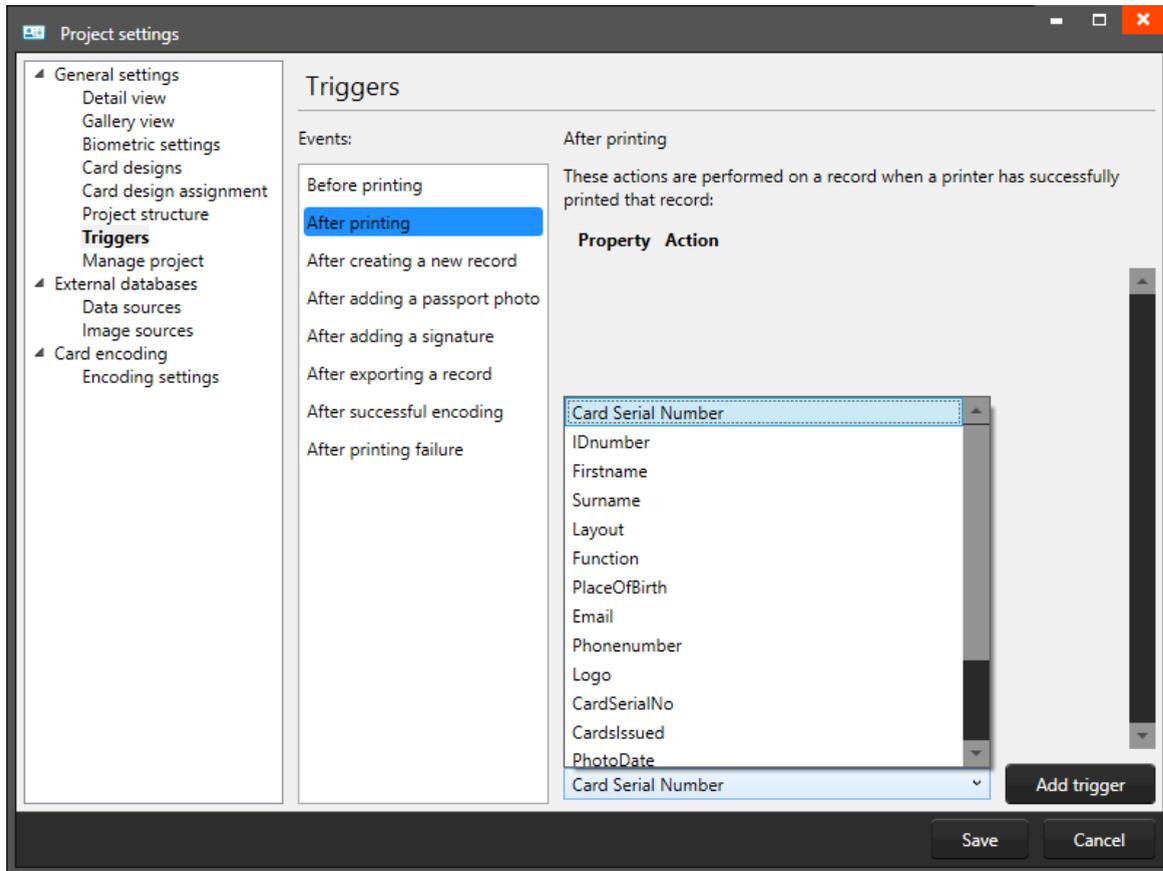
Card Serial Number.



Keep the data type “text”. Now click on “Save”.

Step 3. Add the trigger after printing to read the card serial number to your project

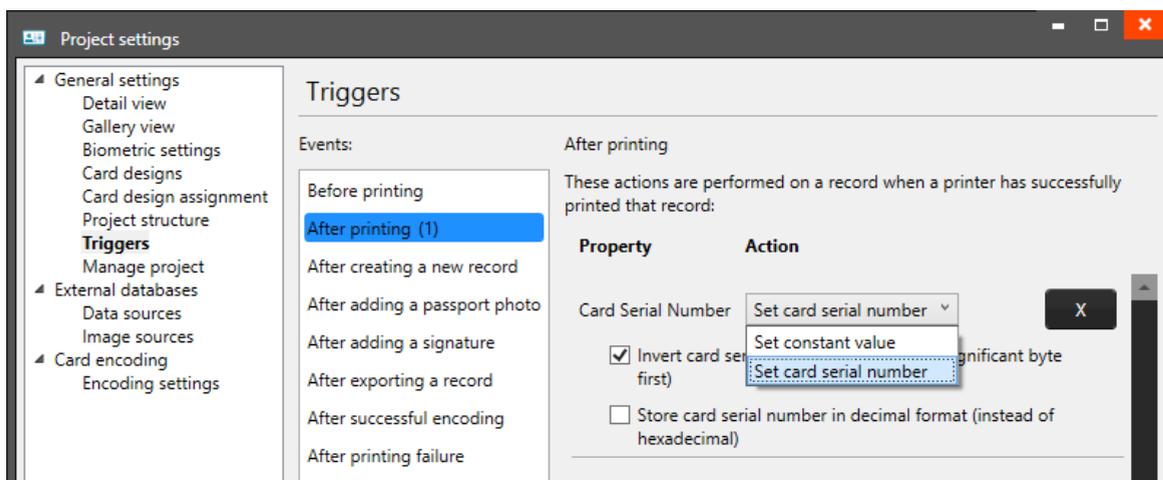
Go to “Edit” in the main menu and go to “Project Settings” and click on “Triggers”. We will now add a trigger on the event “after printing”. Click on the event “After printing”. Now select the data field from the dropdown we would like to add a trigger on “Card Serial Number” and click on “Add Trigger”.



Set the trigger to “Set card serial number”

After adding the trigger for the Card Serial Number data column, select the action “Set card serial number” from the dropdown menu. Also check the first box on how to write the serial number to significant byte first, same as the encoding file.

Do not forget to save this trigger setup.



You have now setup the trigger and PrintStudio will add the card serial number to the column for the record that has been printed.